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See: Confidence — Soil Potassium — W. E. Spreiter
New England Pastures—Washington—Southern Sweets

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POTASH

Better Crops

The Pocket Book of Agriculture

The Whole Truth—Not Selected Truth

VOLUME VIII NUMBER THREE

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Queen o' the May

Better Crops

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VOL. VIII NEW YORK, MAY, 1927 No. 3

CONFIDENCE

By Jeff McDermid

¶ *Jeff says it thrives on obstacles*

CONFIDENCE in 1492 opened the jewel box of Queen Isabella and led Columbus to stake his reputation and three rickety sloops on a bet that the world was round.

Confidence in 1926 filled the jewel box and swelled the charity budget of Queen Marie of Roumania, who had a hunch that Americans were ripe for a royal treat.

Confidence, rather than brute courage, enables my bull pup to chase Sam Smith's Newfoundland dog off the premises. It isn't courage that does it, but the knowledge my bull pup has that the shaggy giant lacks confidence.

Confidence, in one form or another, is the dynamo of existence; the energizing current of life; the main spring of the whole works. It is our lease on mundane affairs and our pledge of immortality. But it must be analyzed and regulated.

Conning the dictionary, I learn that "confidence" has several shades of meaning, and that it has positive and negative attributes.

It signifies "hope" and "assurance;" it denotes "trust" and "faith;" it is related somewhat to "courage."

When the phrenologist feels the bumps of a client's cranium and notes an enlargement of self-esteem it may signify more "gall" than

constructive confidence. That means to me that confidence must possess the balance wheel of acknowledged limitations and the fitness of things before it can work without creaking.

Henry Ford used his supercylinder confidence to put a flivver within the poor man's reach, but his confidence flew off its center when he floated a crew of fanatics on the mine-strewn oceans to halt the World War.

CALLING your attention to my bull pup again, he once mistook a scrappy collie for the Newfoundland, and he is still trying to reduce that painful bump of misdirected confidence.

The difference between Darius Green and the Modern Ace is merely a few decades of faith, falls, experience, and adjustment.

Darius had the right hunch, but his confidence had grown out ahead of his knowledge and judgment. To mistake hunches or hopes for a justified and workable confidence is the thing that paralyzes well directed effort and gums up the wheels of progress.

My Father used to make fun of Darius Green, but he himself spent a lot of time when I was a boy trying to figure out perpetual motion. Father lived to see aeroplanes kiting hither and yon over his cow pasture, but he carried the secret of perpetual motion to his grave.

Self-esteem is built to some extent on confidence, but confidence is not apt to thrive well on self-esteem alone. If I realized all my shortcomings all at once, I would take a hack to the poor farm and be willing forever to work under orders and let the straw-boss do my thinking for me. So would you.

Conversely, if I knew all my latent powers and could train them for constructive use, I would be too busy and too happy for excessive self-love.

"The hero," says Emerson, "is the man who is immovably centered."

I do not think Ralph Waldo failed to see the real difference between confidence and courage; or thought that the development of the ego always led to egotism.

I have a neighbor who is so deathly afraid of burglars that he went to work on a new fangled alarm and trap system which worked and made him independent.

He had no courage, but his personal cowardice and its discomforts gave him confidence enough to rig up a contraption that killed his fear—and mine, too, for I bought one.

My Uncle once heard a skunk in his hen coop. He took down the old shotgun and started for the door, but suddenly stopped and said: "The spirit is willing but the flesh is weak!" Surely, he was not afraid of personal injury, but he had a lot of confidence in the immutable laws of nature!

In the face of worthy trial or of hatred, and when common sense dictates definite action, courage and confidence go hand in hand. Mere physical prowess or even preparedness does not and cannot inspire confidence and courage at the same time.

Ingrowing egotism has likewise bit the dust and met ignominious defeat when it was mistaken for courage with girded loins.

CONFIDENCE is dual. We have confidence in ourselves, and confidence in the rest of mankind and in animate and inanimate things.

The balanced confidence we have in ourselves breeds the necessary faith that engenders the confidence we have in others and in animals;

(Turn to page 62)

The five leaf ivy lends an inviting coziness to the plainest entrances

VINES

By C. L. Burkholder

Division of Horticulture, Purdue University

'Mid pleasures and palaces
though we may roam
Be it ever so humble, there's
no place like home.

BRICK and stone buildings are frequently given a trim of Bedford stone or some other building material which differs from that used in the major part of the structure. Such "trims" add style and finish to the building without detracting in any way from the natural beauty of the original building material.

Brick and stone buildings may also be given a trim of vines. This treatment breaks the large flat surfaces as well as softens and adds a bit of green color, which is in delightful contrast to the sameness of the average brick or cement structure. Brick buildings, as well as those of cement and stucco structures look best when only partly covered with vines. Unsightly dwellings or sheds of stone or wood can be completely covered with vines. Where there is little or no space for foundation plantings of shrubbery and trees, there is usually room to plant vines, and what a remarkable help they are in beautifying the home grounds.

There are two vines which are hardy in all parts of the central west and rugged enough to be especially satisfactory for use on stone work of any kind. The first and best of these is Boston ivy. It is a sure climber and clings so

close to the wall that it affords little or no roosting or nesting place for sparrows. When planted on the south side of buildings where there is no protection from the winter sun, it sometimes kills back in the winter, but quickly covers the killed area early the following summer. The east, west, and north sides of the building are ideal locations for Boston ivy. The other vine mentioned is known as Engleman's ivy. It is a variety of the common five-leaf ivy or Virginia Creeper, but has a thicker foliage and is a much better climber than its parent. Engleman's ivy gives a much heavier covering than Boston ivy, and has the disadvantage of sometimes becoming a favorite roosting and nesting place for birds.

RAMBLER roses of such hardy types as Hiawatha, Silver Moon, Dr. Van Fleet, and Excelsa are excellent for pergolas and fences but are rarely used to good advantage against the house or porch. The old fashioned wisteria will climb to the top of the windmill or cover an arbor in a most satisfactory manner and may be had in several attractive colors. In August the white clematis is a solid mass of small, white, star-shaped blossoms and is especially showy as there are very few shrubs and trees that bloom at that season.

•

FOR the small investment involved no other plant material will give so much in return as vines. Like all other plants, however, vines require some attention in the matter of proper planting and care. First, do not set vines of any kind right up against the building, keep them 8 or 10 inches away from the foundation. Second, if the earth where the vine is being planted proves to be poor fill dirt, dig a hole as big as a bushel basket and fill in with good garden soil. Third, protect the vines the first few years with a ring of low stakes in a circle three feet in diameter, and put at least a bushel of stable manure about each vine after it is planted.

The application of several cupfuls of a high grade commercial fertilizer about each plant is very beneficial. This should be done every spring as growth is starting and is best hoed into the ground over the root system.

Boston ivy will cling effectively to any surface

Soil Potassium

By J. W. Ames

Ohio Agricultural Experiment Station

¶ *This is a reprint from the Bimonthly Bulletin, Jan.-Feb., 1927, Ohio Agricultural Experiment Station*

CHEMICAL analyses of a wide range of soils show that the total amount of potassium, except in peat and muck, is largely in excess of the nitrogen and phosphorus. Because of its abundance in most soils, potassium is generally regarded as the least frequently deficient of the three plant food elements considered of importance from the standpoint of additions in fertilizers.

Availability, as applied to plant nutrients of the soil, is a relative term. Since the particular requirement of a crop and its ability to obtain nutrients from the soil determine, in a measure, the availability of any element necessary for good crop production, the available supply of an element in a given soil may be sufficient over a longer period for some crops than for others.

Indications from crop yields.—Yields of potatoes and corn from certain fertility plots on Wooster silt loam soil that contains 30,000 pounds of total potassium per acre to the depth of 6 2/3 inches show the effect of the gradual depletion of available potassium.

Potatoes, wheat and clover have been grown in a 3-year rotation at Wooster for 30 years Throughout this period phosphorus has been more effective than potassium for wheat and clover. The same was true for potatoes for several years after the experiment was started. There has been, however, a marked contrast in the relative effects of potassium and phosphorus during the latter half of the period through which this experiment has been continued. The yields of potatoes for several plots, as given in Table 1, show that phosphorus was more important than potassium during the

TABLE 1.—Potato Yields, Averages For Two 15-Year Periods

Plot	Fertilizer added in each rotation of 3 years, pounds per acre	15-year average 1894-1909 Yield *Bu.*	15-year average 1894-1909 Increase *Bu.*	15-year average 1909-1923 Yield *Bu.*	15-year average 1909-1923 Increase *Bu.*
2	Acid phosphate, 320	182.62	14.96	87.59	—2.08
3	Muriate potash, 200	178.79	9.52	111.51	23.10
6	Acid phos., 320; nitrate soda, 200, dried blood, 50	182.74	20.79	99.24	12.13
8	Acid phosphate, 320; muriate potash, 200	189.09	30.66	124.21	38.75
9	Mur. potash, 200; nitrate soda, 200; dried blood, 50	171.52	12.16	118.26	34.44
	Average unfertilized yield	154.02	....	86.70	....

TABLE 2.—Corn Yields; Unlimed and Limed Soil, Section C

Plot	Fertilizer applied in 5-year period, pounds per acre		Yield and increase in bushels per acre							
			1908		1913		1918		1923	
			Yield	Inc.	Yield	Inc.	Yield	Inc.	Yield	Inc.
2	Acid phosphate, 320	Unlimed	31.00	11.93	24.00	12.81	18.93	7.12	13.79	6.98
		Limed	36.79	8.25	28.71	13.35	16.29	—.19	22.21	4.00
3	Muriate potash, 260	Unlimed	20.00	.36	8.29	—1.37	10.43	—1.33	6.57	.10
		Limed	33.36	4.48	17.64	2.21	32.36	16.48	37.86	19.15
6	Acid phosphate, 320; nitrate soda, 480	Unlimed	38.93	14.19	22.29	10.58	24.50	11.36	22.93	15.55
		Limed	47.79	17.48	31.29	14.50	26.71	5.19	19.43	—2.26
8	Acid phosphate, 320; muriate potash, 260	Unlimed	39.43	13.36	27.93	15.81	23.36	9.98	17.00	9.83
		Limed	46.29	15.29	38.29	19.57	37.86	14.96	40.86	18.41
9	Muriate potash, 260; nitrate soda, 480	Unlimed	28.57	3.43	14.21	3.47	18.07	5.16	12.07	5.74
		Limed	41.57	10.42	26.93	6.93	38.50	17.33	39.21	17.23
11	Acid phosphate, 320; muriate potash, 260; nitrate soda, 480	Unlimed	40.00	17.12	32.93	23.50	20.57	8.85	34.00	28.05
		Limed	49.29	18.60	42.29	21.48	45.50	24.59	50.29	26.62

first 15-year period, while the opposite has been true during the last 15-year period. This was due to the heavy drain upon the soil's supply of potassium by the potato crops.

The corn crop requires an abundance of available potassium. Corn has been grown for 32 years at Wooster in a 5-year rotation of corn, oats, wheat, clover, and timothy. Various fertilizer treatments have been made and all plots have been limed on one-half and left unlimed on the other half. During the later years of this experiment the corn crop on the limed soil has given marked evidence of a depletion of the available potassium supply. The crops of the rotation were larger on the limed land and removed more potassium from it than the smaller crops removed from the unlimed soil. Corn yields for several plots of the section from which soil samples were taken for chemical study are given in Table 2. It will be observed that during the earlier years of the experiment, the potassium supply appeared to be more nearly adequate for corn than in later years, when there has been marked response to additions of potassium on the limed land.

Indications from soil analyses.—Soils from fertility experiment plots were analyzed to ascertain whether there was a correlation between the more active potassium, soluble in dilute acid, and the soil treatment and crop yields. Results for several of the plots of the 5-year rotation fertility experiment are shown in Table 3. The greater removal of potassium by increased crop yields on limed as compared with unlimed soil is indicated by the smaller amounts of dilute acid-soluble potassium found in soil from the limed portion of all plots regardless of fertilizer additions. Approximately the same amount was dissolved from limed soil fertilized with muriate of potash, as from unfertilized and unlimed soil. The lowest amount of acid-soluble potassium was found in the limed ends of plots 2 and 6 receiving, respectively, acid phosphate and a combination of acid phosphate and nitrate of soda. On these plots no potash was supplied in the fertilizer, but the crop yields have been increased by the phosphorus and nitrogen supplied, resulting in a heavier drain upon the supply of native potash in the soil.

One-half of each of the fertility plots on the clay loam soil of the Northeastern Test Farm at Strongville is cross-dressed with floats, and the other half with lime. Larger crop yields have

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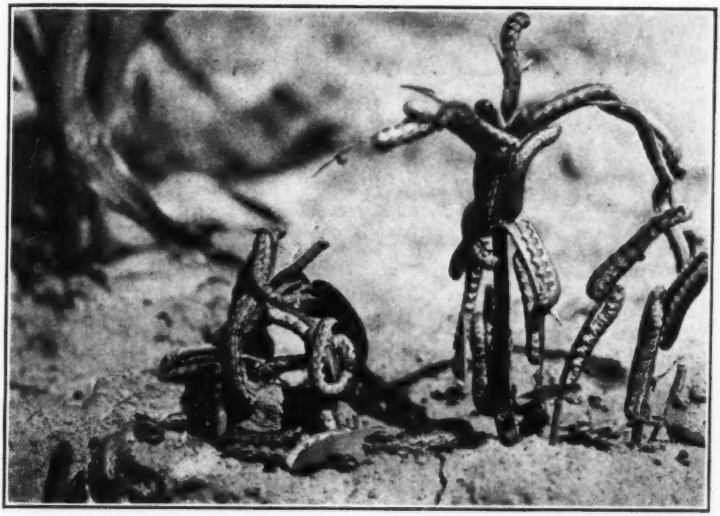

Army worms destroying a western cornfield

CUTWORMS

By Don B. Whelan

Entomologist, Nebraska College of Agriculture

CUTWORMS cause more widespread injuries and are responsible for more inquiries on the part of the farmer, gardener, and others who cultivate the soil, than most classes of injurious insects. Year after year in the spring they do widespread damage to garden and field crops, especially to corn, cabbage, cauliflower, tomato, beans, and onions.

In Canada it is said that the annual loss from cutworms amounts to hundreds of thousands of dollars. During the year 1900 one species alone—the variegated cutworm—destroyed crops in British Columbia valued at $168,000, while the losses in the other provinces totalled over $200,000. That same year Dr. F. H. Chittenden, a government entomologist, estimated the total damage caused by this species of cutworms in the United States and Canada at the enormous sum of $2,500,000. Another cutworm called the army worm has done a considerable amount of damage in the central states the past few years.

There are many different kinds of cutworms, named from their appearance or because of their habits. Among them are the variegated cutworm, glassy, greasy, dingy, spotted, red-backed, dark-sided, striped, yellow-headed, and

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W. E. Spreiter

(County Agent Par-Excellent)

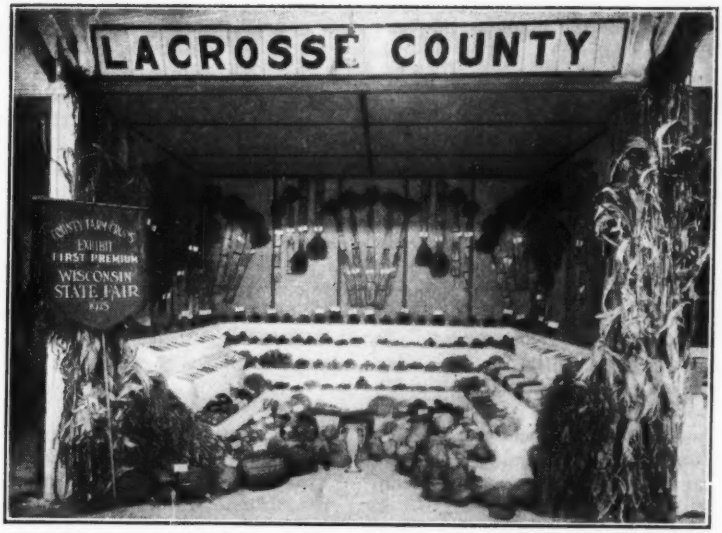
By Dr. Guy A. Peterson

Madison, Wisconsin

W. E. SPREITER is the only county agent La Crosse county, Wisconsin, has had, but in all his years of experience he has been present at every meeting save one that he has scheduled himself to attend. In a county where clay bluff roads sometimes are so slippery that it is dangerous to drive even with a horse and buggy, this is an attendance record that few men can equal.

Spreiter was born on a 160-acre farm near Concord, Minnesota, in 1879. After graduating from high school and taking a year at the Wilder Military Academy, he enrolled in the three-year agricultural course at the Minnesota College of Agriculture, receiving his diploma in the spring of 1902. During the next three years he worked on the home farm a part of the time, earned his state steam license by running an engine for a thresher and clover hulling crew, and learned considerable of the carpenter trade by helping erect several buildings in his home community. He also was swine herdsman for the Minnesota College of Agriculture for nearly a year, dur-

Mr. Spreiter showing a farmer how to spread lime in making the soil ready for alfalfa



The winning county farm crops exhibit at the Wisconsin State Fair was put up under Mr. Spreiter's direction

ing which time he fitted his first hogs for the International at Chicago.

In the winter of 1905, Dean Smith of the Michigan College of Agriculture hired him to teach the short course boys in manual training, carpentry, and blacksmith work. When he got there he found no benches, tools, or equipment of any kind, so he had the class build some benches and fit up a carpenter shop in a large barn on the campus. At the close of the school year in June he once more wielded the hammer and saw for his Minnesota neighbors, continuing to do so all that summer.

THE next fall he went to the McIntosh, Minnesota, high school as manual training instructor, where he built and equipped a shop with student labor. For two years he remained there, but not satisfied with his salary, he again returned to his home community to build barns. He says that had it not been for the extremely cold winter of 1908, he might have been a carpenter yet. He nearly froze his hands off when rebuilding a neighbor's barn that had burned in November of that year, so when Professor Boss of the Minnesota College of Agriculture got him a job as manual training instructor at the La Crosse County School of Agriculture to start work in January, 1909, he accepted at once. Since then he has given most of his time and energy to serving the farmers of that county, for though he did not become a county agent until early in 1919, he did much extension work while in the school.

He built the first forms for a concrete silo ever made in the county. They were first used in 1912 on the P. A. Larson farm, and several sets of forms have since been worn out. One morning he got a telephone call from a farmer near West Salem. It seemed that the carpenters were out on the farm, but they were

afraid to cut the beautiful long timbers for the plank frame barn. Spreiter hurried down to the railroad station, boarded the first train to West Salem, cut or directed the cutting of the lumber, bolted the timbers together and had the first bent ready to raise by evening. He then caught the train back to Onalaska and was home before six o'clock. Since that episode he has drawn plans for 64 barns, made up complete sets of plans for nine residences, a Masonic hall, one garage, the West Salem Sales Pavilion which is said to be the largest in the Northwest, eight country school houses, and one church, in addition to a large number of poultry houses and other smaller buildings. A great number of La Crosse county farmers can tell of successful ventilating systems that he has planned for their buildings.

In maintaining his remarkable attendance record he has had to use various means of conveyance. It was nothing unusual for him in the early days before roads were improved to start out in a car and finish the trip in a wagon or sleigh, on horseback, or even on foot. One time he drove his car up a ridge road for a meeting in Mormon Coulee. He got stuck in a snow-drift, so he walked through the woods to the home of the nearest farmer and got him to hitch up a team to a sled. When they arrived at the meeting-house, an hour after starting time, they found it full of people. "It proved to be one of the most interesting and worth while meetings we had all year," said Spreiter.

THE one meeting he failed to attend was held in a German settlement 27 miles from his office in the spring of 1923. Spreiter started early because he knew that there was a long muddy ride before him, but the chuck holes proved to be too much for his car. When within five miles of his destination the machine stopped with its hind wheels spinning and refused to navigate the foot-deep sea of mud

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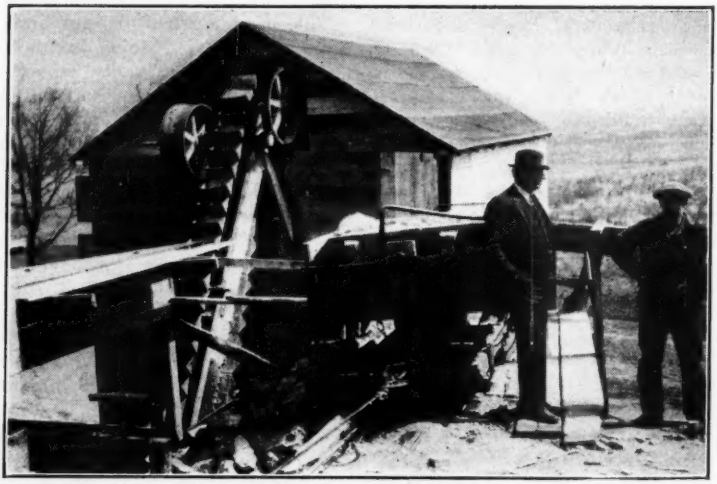

W. E. Spreiter (left) visiting one of the limestone crushers which he so enthusiastically supports

New England Pastures

By Ford S. Prince

Soil and Crop Specialist, University of New Hampshire

A BIRD'S-EYE view of the pasture situation in New England reveals the fact that for the six weeks, beginning with June 1 and ending July 15 of each year, a cow is justified in roaming over the fields, while the rest of the season her efforts are rewarded with little unless the exercise is taken into consideration.

New England pastures are getting worse instead of better. The absence of sheep where they were formerly abundant is, no doubt, one contributing cause of the retrogression of pastures. With the present scarcity and high price of labor, farmers do not find the time or funds to rid their pasture fields of the hard-hack, gray birch, sweet fern, trailing juniper, and other enemies of good pasture fields. During the past five or six decades the soils in these pastures have been getting poorer and the stand of desirable pasture grasses has been reduced because they no longer find sustenance for their abundant growth. The situation in other states where acid soils and permanent pastures are prevalent is much the same.

The question now uppermost in the minds of dairymen who are thinking seriously about the situation is, would it be better to try to improve a large area of pasture land or concentrate upon a few acres which can be plowed or at least disked and allow the rest of the present pasture land to revert to forest, the direction in which much of it is now headed.

J. R. Graham, of Boscawen, N. H., has answered this question to his own satisfaction by growing seven acres of sweet clover. Seeded in 1925, it furnished considerable pasture that fall, even after a nurse crop had been removed, and in 1926 this area served to supplement the other pastures of the farm so well that little green feed had to be carried to the herd of 27 cows during the short fall months. "I do not know what we would have done without that sweet clover," Mr. Graham says. Incidentally he is preparing 21 acres for sweet clover in 1927.

WILL this not answer the question for a good many dairymen? Rather than fence fields where it takes eight acres to support a cow, is it not better to spend some money for lime and fence for a field which, seeded to sweet clover will carry a cow for every acre? Such a system eliminates the cutting and hauling of green feed to the cows during the fall, for an adequate acreage of sweet clover will carry the cows, lengthen the present pasture season at least six

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Dean Edward C. Johnson is the fifth man from the left (first row) in this picture of the staff, Washington Agricultural Experiment Station

Washington —

By Edward C. Johnson

Dean and Director, State College of Washington and the Washington Agricultural Experiment Station

IN the State of Washington there are various forms of specialized agriculture such as dairying, poultry raising, fruit growing, and grain production. Many of the 73,267 farms of the State are producing field crops as a major enterprise and some phase of crop production is practiced on nearly every farm. It is often necessary for the dairy farmer who produces his own feed crops to make a more careful study of crop production in his diversified cropping system than the farmer who devotes his energies to the production of a single crop like wheat.

Farmers engaged in the various forms of agriculture are confronted with problems in connection with crop production and soil management and the Divisions of Farm Crops and Soils of the Washington Agricultural Experiment Station of the State College are continually called upon to supply information for their solution. In planning the activities of these divisions of the experiment station, such problems have been made the basis for investigations conducted, and the information thus obtained in regard to crop production has

James Wilson Hall, the main building of the State College of Washington, is also used for the work of the Experiment Station

the Evergreen State

¶ The thirteenth visit in our series brings us to a state whose agricultural industry has progressed by leaps and bounds in the last three decades

been made available for the improvement of crops and crop practices.

The Washington Agricultural College, Experiment Station, and School of Science, now known as the State College of Washington, were established by an Act of the Washington legislature approved March 9, 1891. A locating commission was appointed by the Governor, which, on the 15th day of April, 1891, selected Pullman, in Whitman county, as the site for the new institution. Here a tract of 220 acres of Palouse land was made available for its use.

Dr. Geo. Lilly was selected as the first president of the institution. He was also made the first director of the experiment station.

In 1893, Dr. Lilly was succeeded by J. W. Hestom, formerly president of the South Dakota Agricultural College. In the same year he in turn was succeeded by Dr. E. A. Bryan, who continued as president of the College for 23 years and as director of the Experiment Station until 1907, when R. W. Thatcher, now director of the New York Experiment Station, and who came to the Station as assistant chemist in 1891, became director.

Director Thatcher served from 1907 to 1913, and on his resignation was succeeded by Ira D. Cardiff, at that time botanist of the Station. On the resignation of Direc-

tor Cardiff in 1917, Professor Geo. Severance, agriculturist of the Station, was made acting director and served in that capacity until 1919, when Edward C. Johnson, the present director, one time pathologist in charge of the cereal disease work of the U. S. Department of Agriculture, and later dean of the Division of Extension of the Kansas State Agricultural College, succeeded him.

AMONG the distinguished men who have served on the Station staff are the late C. V. Piper, botanist of the Station from 1892 to 1903, who later became agrostologist in charge of Forage Crop Investigations of the U. S. Department of Agriculture; and Dr. W. J. Spillman, agriculturist of the Station from 1893 to 1905, later head of the Office of Farm Management of the Department, and now agricultural economist of the Department. The latter started the plant breeding work which has been emphasized at this Station since that time, and in 1901, independently discovered Mendel's Law of Recombination.

E. E. Elliott, now director of vocational education for Oregon; Dr. S. B. Nelson, now director of the Extension Service of the State College of Washington; R. K. Beattie, H. B. Humphrey and M. A. McCall of the United States Department of Agriculture; Geo. A. Olson, of the Gypsum Industries; A. L. Melander, of the College of the City of New York; and O. L. Waller, vice-president of the State College of Washington, for many years served on the staff of the Washington Agricultural Experiment Station, a staff now consisting of 40 members.

Headquarters of the Main Experiment Station are at Pullman, Washington, in connection with the State College. Here are the main laboratories, and a college farm, consisting of 573 acres, much of which is used for experimental work. Dairy cattle, beef cattle, hogs, sheep and poultry on this farm are used for instructional and experimental purposes. In addition, there is experimental work in crops and soils, horticulture, plant pathology, entomology, and agricultural engineering, and research work in farm management and agricultural economics.

Four branch stations, two of them in the dry land section, one in the irrigated section, and one in the cranberry section, have been established. The branch stations at Lind and Waterville, of 320 and 200 acres, respectively, were organized in 1915 and 1917, and are working on problems of cereal and forage production and soils and soil management under semi-arid conditions. The Irrigation Branch Station at Prosser was organized in 1919, and consists of a farm of 200 acres under irrigation. Irrigation studies and experiments with crops, soils, horticulture, and pastures, and in the feeding of beef cattle and sheep, are here conducted. The Cranberry Station at Long Beach was established in 1922, and devotes its entire time to problems of the cranberry industry.

THE organic law of the "Agricultural College, Experiment Station, and School of Sciences" specifies that at least one experiment station shall be maintained in the western part of the State. Under this provision, the Western Washington Experiment Station was established at Puyallup in 1895. This consists of a farm of 150 acres well improved, with necessary buildings and equipment for work in dairying, poultry, diseases

(*Turn to page 55*)

ANALYSIS OF SAMPLE OF CLOVER SEED
OFFERED FOR SALE IN INDIANA
WOULD YOU USE THIS SEED?
WHEN BUYING SEED, STUDY THE SEED-LAW TAG AND
"KNOW WHAT YOU SOW"

Campaigning *for* Pure Seed

By *Albert* A. *Hansen*

Indiana Agricultural Experiment Station, Lafayette, Ind.

JUST what is meant by analyzing a sample of seed is a mystery that was solved for a number of farmers and future farmers by the exhibit pictured above. This exhibit, which was used at the Boys' and Girls' Club Round-up at Purdue University, Lafayette, Indiana, during May, 1926, shows graphically just what happens when a seed sample is analyzed in a seed laboratory. Since the exhibit is based on an actual sample of seed exposed for sale in the Hoosier State, it well might be called the largest seed analysis report in the world.

The official weight of sample necessary for analysis in seed laboratories is five grams. In the circle near the center of the exhibit, the pure clover seed contained in the five-grain sample is shown, while the weed seed and other foreign seeds and the inert matter that made up the remainder of the five grams are shown at the points of the arrows. Not only the actual seeds but photographic enlargements showing the characteristics of these seeds are included in this unique exhibit.

The exhibit was part of the general pure seed campaign that is being fostered by the extension service at Purdue.

From Humans to Plants

By Lewis Edwin Theiss

Professor of Journalism, Bucknell University, Lewisburg, Pennsylvania

DEEP in the heart of the Pennsylvania mountains, on the slope of the Blue Ridge, a stricken physician is fighting for his life, and at the same time carrying on a battle for humanity that promises to revolutionize horticulture. The physician is Dr. G. A. Zimmerman, veteran of the World War, who is making a valiant struggle to recover the health he lost while serving in France. And the particular task to which he has devoted his life is the immunization of the chestnut tree against the chestnut blight.

There is good reason to think that he has already accomplished his purpose. If he has succeeded or shall succeed, his victory means far more than the mere restoration of the chestnut tree. It means whole races of immunized trees. It means pear trees immune to fire blight, peaches immune to the yellows, apples immune to scab or scale. It means fruit trees safe from the attacks of their worst enemies. It means so much that the prophet is staggered in his attempt to forecast it all.

Dr. G. A. Zimmerman beside a four-year old chestnut tree

When Dr. Zimmerman returned from France at the end of the war, he was at the breaking point. He had endured almost more than flesh and blood could withstand. He attempted to resume his practice, but soon found himself on his back in a Harrisburg hospital. And there he lay for six months. When he was finally discharged, it was not as one cured, but as one with a sole chance of salvation. That lay is his having rest and being able to spend 24 hours a day in the open.

There was just one place where he could go. By good fortune he owned a twelve-acre tract on the Blue Ridge, on which was a tiny cabin. It had been acquired for recreation purposes. Now Dr. Zimmerman and his devoted wife moved thither, and in this tiny, little home began their courageous struggle for life. In Florida, Dr. Zimmerman secured another bit of woodland, with a tiny cabin, where he could go in winter; for the northern climate is much too severe in winter for one with damaged lungs. In these two homes,

Dr. Zimmerman's mountain home. In the foreground is a cold frame where he forces seeds of nut trees and starts the tiny seedlings

Dr. and Mrs. Zimmerman have lived for six years, battling every moment of that time for life.

Meantime, to keep his mind from his own ills, the doctor began nut culture. I do not mean the planting of nut trees in cultivated rows for quick returns, but the gathering together and breeding up of all the nuts he could secure. From far and wide, through friends and correspondents, he secured living wood from good nut trees. And this wood he grafted on seedlings, big and little, that grow on his place. His idea was to get together a collection of the best native nuts and to use the blooms for cross-pollination and the development of better nuts than have so far existed.

So you will find scores of nut trees of all sorts on the doctor's place—hickories, pecans, walnuts, filberts, chestnuts, and others. For

(*Turn to page* 48)

Superior European filberts in a woody bottom formerly overgrown with wild blackberry thickets showing how Dr. Zimmerman utilizes wild mountain land

BLUEBERRIES

By Richard Hoadley Tingley
Port Chester, New York

Tamed and cultivated they are an enjoyable and profitable crop

EVER go blueberrying? Most of us Northerners have, and recall the experience in some rough, rocky pasture as a back-breaking, toilsome, arduous task. The reward, if you were lucky enough to be rewarded, was often a pint or two of inferior berries—barely enough to make a good-sized pie. If you wanted your wife to put up a few jars in order to assure yourself of a pie or two during the winter months, you wouldn't risk breaking your own back, but would go to the nearest fruit store and, at a price of 50 or 75 cents a quart, buy your supply—bigger, better, sweeter berries than those of your pasture.

The blueberries you now buy at the store very likely grew hundreds of miles away where they are cared for, harvested, and marketed in an up-to-date manner and transported to you through all manner of middlemen, jobbers, and wholesalers.

Blueberry culture is now a recognized industry in several states. In each of these some different kind of culture is practiced on different varieties of berries. Each state, of course, claims that its berries are the largest, sweetest, and best. The industry has reached a high state of efficiency on the farm of Miss Elizabeth C. White near New Lisbon, New Jersey. Her berries are as distinctive from others as is a Baldwin apple from a McIntosh. Being close to the New York market it is probable that many of the berries sold in and near that metropolis come from her plantation; but the season is limited to a few of the midsummer months. If you want blueberries out of season you must follow me down to the "Panhandle" of Florida where hundreds of acres of plantation blueberries that reach the northern markets as early as May are being cultivated.

Blueberry culture in Florida is no experiment since some of the orchards now bearing were set out more than 30 years ago. Differing from the wild northern pasture variety they grow on small trees ranging from eight to ten feet in height with a spread, often, of fifteen feet. The berries are large and sweet, often as large as an ordinary grape; sometimes as big as a ten-cent piece.

THE trees are not propagated from seed, but are dug up from their native bogs from carefully selected stock, transplanted, fertilized, grafted, and nursed into healthy, flourishing, bearing condition. The selection of the bushes from the swamps is a matter of great importance as there are many varieties, only a few being

worth culture.

Many of the plantations of northern Florida are owned by large corporations where botanical experts are employed who assume the duty of selection of the blueberry trees, just as they assume direction over the culture of other agricultural products—for in this section Satsuma oranges, figs, pecans and all manner of truck are being scientifically raised for the early northern market.

It has been found that the early winter is the best time to transplant the trees from the swamps. The average orchard is planted with 280 to 300 trees to the acre. The trees begin to bear after the first or second year and bear commercially after the third or fourth year. When properly cared for there seems to be no limit to their length of life, 35-year old trees still bearing.

The trees thrive in almost any soil in that section of Florida where good drainage is to be had, one requisite being that it must be somewhat acid. The soils most suited to its purpose are of two kinds; one, a rather hard, compact gumbo or muck with a mixture of sand; the other, a gray, sandy loam.

All blueberry soils must be free from lime or sulphur if the trees would do well.

Cultivation should be shallow and frequent. Well-rotted peat, oak leaves, and pine needles make an excellent mulch when the proportion of peat to sand is too small to insure a vigorous growth. Where chemical fertilizers are used, it has been found that the best results are obtained by using about 3 per cent ammonia secured from organic rather than from mineral sources, 4 per cent phosphoric acid, and 6 per cent potash. The quantity should be about a quarter of a pound to two pounds per tree per year, according to the size and age.

So far as has been discovered the blueberry tree and its fruit have none of the enemies that harass the life of other plants and trees and make for so much annoyance to the farmer. The tree has no scale, no insect devours its leaves nor eats into its fruit and no spraying is necessary. The trees and berries will withstand almost any degree of cold that is likely to come to northern Florida—and

Blueberring is fun when the berries grow large and on low overhanging limbs like this

Many acres of Florida land are devoted to blueberry orchards

this means an occasional frost—and the berries require no refrigeration on their journey northward.

The principal plantations where blueberries are now being cultivated are located in Santa Rosa, Okaloosa, Walton, and Washington counties, all being close to the Alabama line. Statistics are lacking as to the number of acres now planted to orchards, and of the total yearly yield. Official reports of the Department of Agriculture at Tallahassee give 112,000 nonbearing trees and 21,450 bearing trees as the totals at the end of 1924. From reports received from plantation owners by the writer, however, these figures appear to be too small.

The Sapp blueberry orchard near Crestview, Okaloosa county, contains 120 acres planted with trees ranging from three to 33 years old. In this orchard are many trees producing from 14 to 20 quarts of berries a year; some of the older ones going as high as 30 or 40 quarts. Near Milton, in Santa Rosa county, there is a blueberry orchard of 780 acres—the largest in the state—also, an 80

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The blueberry trees often grow to a height of 10 *ft.*

VISIT U. S.

¶ Important delegation of large German agricultural industry pays visit

LEADING men of the German Potash Syndicate have recently paid the United States a visit in the interest of supplying Genuine German Potash to the American farmer. Arriving the latter part of March, the delegation has spent several weeks here surveying the agricultural conditions and planning the future of its product, large tonnages of which are used annually in American crop production.

General Director A. Diehn headed the party which included Dr. Maxmilian Kempner, Counselor of the Board of Directors, and Professor Dr. Oskar Eckstein, Head of the Scientific Research Department of the Syndicate. The sale of genuine German potash salts is now entrusted to the firm of R. Kunze, 40 Rector Street, New York City. Up to April 30 the product had been handled by the Potash Importing Corporation of America.

Messrs. Diehn and Kempner returned to Germany April 22. Dr. Eckstein is to stay in this country for several weeks in order to study American agricultural conditions and to enlarge the scientific and educational service of the Syndicate.

Potash is becoming more and more necessary to successful and profitable crop production. In addition to increasing yields, scientific research has within the past few years demonstrated the important role this element of plant food plays in improving quality and in producing disease resistance within plants.

The German mines have always been the chief source of supply of the world's potash. Deposited by sea water under peculiar geological conditions, these salts are found in very thick and extensive deposits in middle and north Germany.

The import of German potash salts to America, important as it is from the standpoint of scientific agriculture, amounts to less than three per cent in value of the United States export of agricultural products to Germany. Calculated in dollars, the value of United States export of agricultural products to Germany amounted in 1924 to $314,000,000, while the value of the United States importation of German potash amounted in value to less than $8,000,000.

Just as Germany is in need of American agricultural products to safeguard the nutrition of her inhabitants, American agriculture is in need of German potash salts for the nutrition of her crops and particularly in order to enable her to produce an excess of flour, cotton, fruit, and meat which can be exported to countries with a deficit of farming production, such as Germany.

Southern Sweets

By R. B. Fairbanks

¶ *An interesting account of a growing industry*

THE sweet potato is becoming quite an important cash crop in the South. It has been grown there for a long time but only in comparatively recent years has it become commercially important.

The normal acreage devoted to this crop in the United States is usually around 750,000 to 800,000 acres. All of this acreage, with the exception of from 75,000 to 85,000 acres is in the thirteen southern states. A few of the northern and eastern states grow them, but only on a comparatively small scale.

The average yield is usually in the neighborhood of 100 to 125 bushels per acre. Of course, very much larger yields than this are produced, but we are speaking of the average for all the acres planted. However, during the past two or three years, the yield has been very much lower than this, due to unfavorable weather conditions.

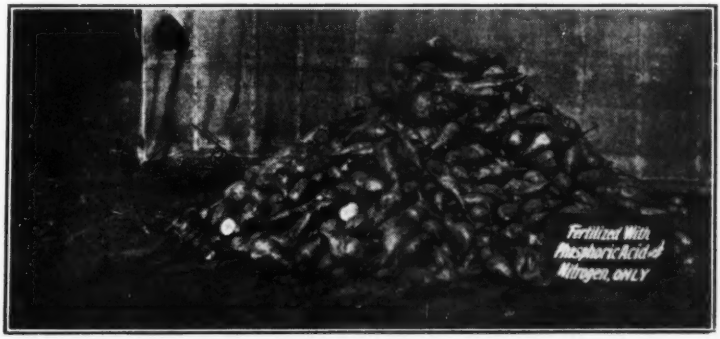
For 1924 and 1925 and the first part of 1926 the price of sweet potatoes has been very high, due to a shortage in acreage and yield.

THE normal consumption of sweet potatoes in the United States is just slightly under one bushel per capita, whereas the yield for the past two years has been well down below three-fourths of a bushel per capita. The consumption in the United States has shown a considerable increase in the past decade or so, as it was not many years ago when one-half to six-tenths of a bushel per capita was the normal consumption.

It takes approximately 100,000,000 to 110,000,000 bushels of sweet potatoes to supply the normal demand in the United States. It is believed, therefore, that as long as the yield does not go materially above 100,000,000 bushels, the price will hold around the point where it might be called reasonable. It is believed that the acreage and the yield can be gradually increased without forcing the potatoes down to a price below where they will be profitable, because it is clearly evident that the consumption per capita is increasing. This is due largely to the fact that folks in the North and East are finding out more about the sweet potato, and as they find out more about it, they eat more of it.

The market for southern sweet potatoes is being extended all the while, because they are a delicious food, rich in food value, and can be cooked in so many different ways to make really delightful dishes. Formerly the northern and eastern markets liked only the white or mealy potato. This con-

No fertilizer was used on the field in Georgia where these sweet potatoes were grown. The yield was 43.6 *bus. per A.*



1,000 *lbs. of a* 6-4-0 (*PN*) *fertilizer applied to the same type of land resulted in a yield of* 107.2 *bus.*

When potash was added, and 1,000 *lbs. of a* 6-4-10 (*PNK*) *applied, the yield jumped to* 138.8 *bus. per A.*

dition is rapidly changing, for when one of the yellow, juicy yams is once properly cooked and eaten by a person who has been eating the mealy white varieties, in most cases it is exit for that white variety.

The most popular variety for those markets liking a dry, mealy potato is the Big-Stem Jersey. The Triumph is also popular in some of the markets. This variety is grown in certain sections of the South, but only for the early market. Neither the Big-Stem Jersey nor the Triumph is liked in the South.

The two outstanding varieties for southern markets and to an ever increasing extent for many northern and eastern markets are the Porto Rico and the Nancy Hall. Both of these are yellow, juicy varieties that are so much liked by those who have been eating sweet potatoes for a long time. It is nip and tuck between the Porto Rico and Nancy Hall varieties in the South. In some sections one is the more popular and in others the other is more popular. In certain sections of the South, the Nancy Hall is grown exclusively. In other sections the Porto Rico is grown exclusively. Some markets prefer the Porto Rico, others the Nancy Hall. Suffice it to say that both are excellent varieties and are the standard for excellence and yield in the South, except where the mealy varieties, such as the Big-Stem Jersey and Triumph are grown for eastern and northern markets.

As is well known, the seed are bedded a month to six weeks before time for the plants to be set in the open and these slips or plants are pulled from the bed and transplanted to the fields in the spring and early summer. The sweet potato is quite tender and is not put in the field until all danger of frost is over. The time of setting varies from March to June in the different sections of the South, depending on whether or not one is growing an early, medium, or late crop. In most sections of the South the potatoes will mature when the plants are set as late as June or early July. For the main crop, however, most of the plants are set in late April and May.

The most troublesome thing connected with sweet potato growing is the rot. By means of soaking the seed in corrosive sublimate before bedding, then bedding on soil where diseased potatoes have never been bedded or grown before, and setting the plants in a field where diseased potatoes have not been grown before, this disease is largely controlled.

THE sweet potato needs a comparatively long season to grow. It is somewhat subtropical in its nature. This is natural when we remember it is a native of tropical America. There is no wonder then that about 90 per cent of this crop is produced in the southern states. A growing season of at least four months is necessary. Considerable water is needed. Therefore, the heavy rainfall that occurs in most of the South is ideal for the growth of this crop. It is in the early growing period of the crop, however, that most of the water is needed, as an ideal condition for the sweet potato crop is realized when most of the rain falls between the time the plants are set in the field and when the vines cover the ground. After that time comparatively dry weather is best.

A sandy loam with a clay subsoil that is well drained is the best soil for sweet potatoes. It is a fact, however, that this crop will

succeed in about as wide a range of different soil types as almost any other crop, provided the growing period is long enough and the drainage is good. On an average, very fertile fields are not best, as in this case there will be too much vine production at the expense of potato production. Then, too, when grown on soil too rich, the potatoes are rough, irregular in shape, and often too large, all of which make them less desirable as market potatoes.

It is also desirable in selecting land to grow this crop, to avoid a soil that is too deep and porous. A deep soil with a sandy or a very porous subsoil will result in long, stringy potatoes and these, of course, are undesirable for market. Therefore, a very deep soil is not desirable. Neither is a very shallow one desirable. The best soil is one that is six to eight inches deep with a clay subsoil underneath just porous enough to carry off the surplus water.

The soil wants to be thoroughly prepared for this crop. It should be broken and thoroughly pulverized, and if this is done, the crop is literally half made. We have seen good crops produced where the potatoes received only two cultivations. This, however, is not ideal, because rapid and frequent cultivation should be given until the vines cover the ground.

Few crops respond more definitely to the liberal use of high grade commercial fertilizer than the sweet potato. One must avoid using too much nitrogen, as this will tend to cause the plants to go too much to vine. Neither should one be too stingy with nitrogen, because a good liberal vine growth is necessary in order to have the proper development of a good crop of potatoes.

On soils that are medium poor a fertilizer analyzing 8-5-6, that is, 8 per cent phosphoric acid, 5 per cent nitrogen and 6 per cent potash is a good one. On soils that are medium fertile a fertilizer analyzing 9-4-7 has given excellent results. At least 700 pounds per acre should be used. One thousand pounds per acre is better. Many growers, especially those growing for the early market, use even more than this quantity.

A high percentage of potash is essential to the most economical production of a heavy sweet po-

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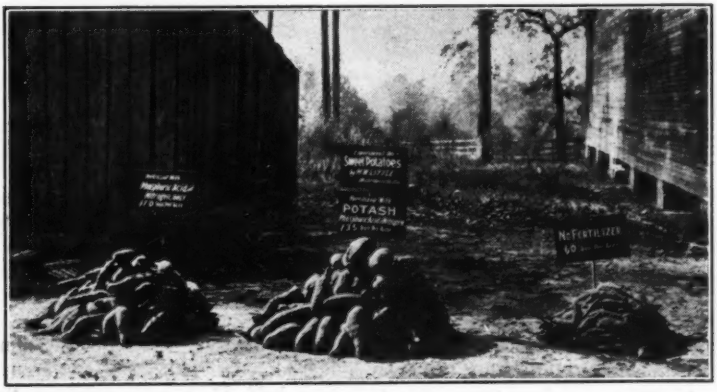

800 *lbs.* 6-4-0 (*PN*) 110 *bus. per A.* | 800 *lbs.* 6-4-10 (*PHK*) 135 *lbs. per A.* | *No fertilizer* 60 *bus. per A.*

The International Congress *of* Soil Science

By L. R. Ender

United States Department of Agriculture

ON the face of this earth where man must get his living there are 52,000,000 square miles of land. If temperature were the only factor, wheat could be grown on 41,000,000 of them. But, temperature is only one factor. When moisture comes into the problem in addition to temperature the area possible for wheat is reduced to 11,000,000 square miles. When the character of the land surface is taken into account the possible wheat area drops still further, down to 7,000,000 square miles. And when to these factors is added the nature of the soil, how many square miles will there be on which the basis of the white man's bread can be grown!

This is one of the serious basic problems confronting humankind, and man is trying to find the answer, which one noted scientist has estimated may be about 5,500,000.

In order to become more familiar with these problems, plans are now being made for the meeting of the first International Congress of Soil Science to be held June 13-22 in the United States Chamber of Commerce Building, Washington, D. C. This meeting is being called by the International Society of Soil Science, which has a membership of nearly 700 individuals and organizations representing 40 countries, including, besides the more prominent ones, Egypt, Esthonia, India, Sudan, South Africa, Greece, Honduras, Latvia, Lithuania, Palestine, Surinam, and Czechoslovakia. This Congress, it is expected, will bring together scientific men who will be able to put together a better picture of the soil conditions of the world than now exists.

The first International Meeting of Soil Scientists was held in Budapest, Hungary, in 1909, at the invitation of the Royal Institute and under the auspices of the Royal Minister of Agriculture. In the following year a similar conference was held in Stockholm, the delegates at this meeting voting to meet again at St. Petersburg in 1914. The intervention of the World War prevented further meetings until 1921 when the delegates met at Prague in Czechoslovakia.

Previous to 1921 the conferences were concerned almost exclusively with matters of soil mapping and classification. At the Prague meeting, however, a reorganization was effected and the scope of the conference considerably enlarged. In 1924 the conference was held at Rome, Italy, at the

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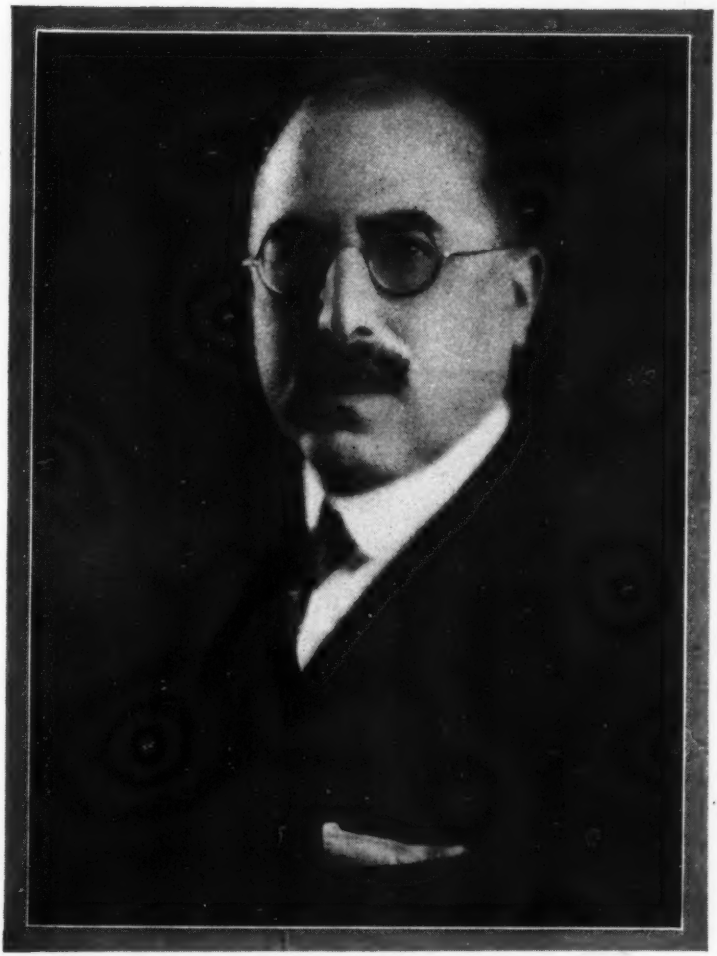
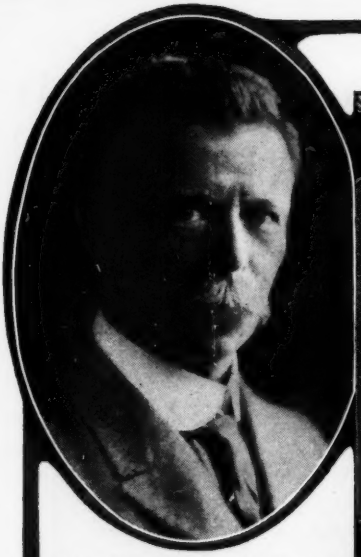
Better Crops' ART GALLERY of the month

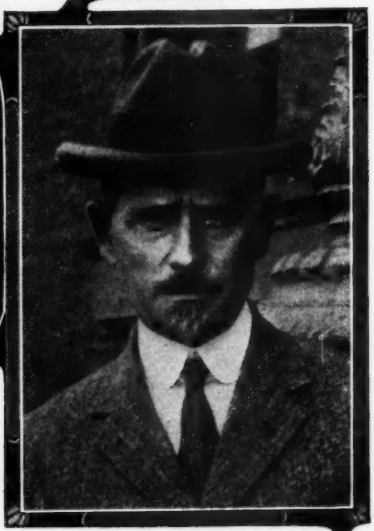


DR. JACOB G. LIPMAN

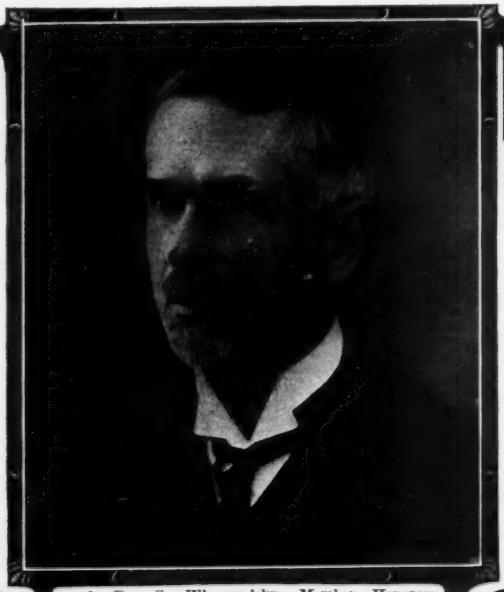
Dean and Director of the New Jersey State College of Agriculture and Agricultural Experiment Station, is president of the International Society of Soil Science.



Sir John Russell, Director of Rothamsted Experiment Station; Member Honorary Committee, International Society of Soil Science, Harpenden, England.



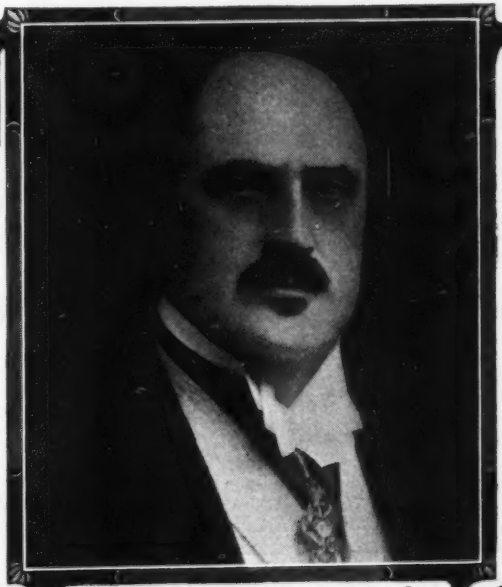
Prof. N. M. Tulaikov, Agricultural Experiment Station, Saratov, Russia.



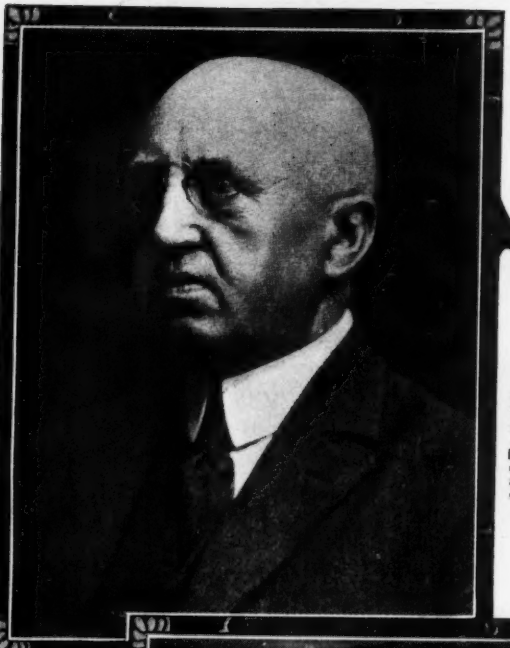
Prof. Dr. S. Winogradsky, Member Honorary Committee, International Society of Soil Science, Paris, France.

Dr. D. J. Hissink, Acting-Pres., International Society of Soil Science, Groningen, Netherlands.

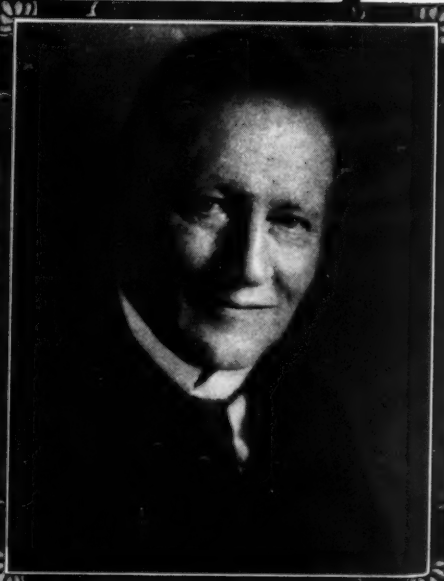
Dr. Alexius A. F. de'Sigmond, Pres., Second Commission, International Society of Soil Science, University of Technical Sciences, Budapest, Hungary.



Dr. J. Stoklasa, Pres., Third Commission, International Society of Soil Science, Prague, Czechoslovakia.



Prof. Dr. F. Schucht, Berlin, Member of the Board of Directors of the International Society of Soil Science, Director of the Institute of Geology, Mineralogy, and Soil Science, Agricultural Department, University of Berlin.



Geh. Regierungsrat Professor Dr. Penck, Berlin, Director Geographic Institute, University of Berlin.

These girls are learning practical farming at the Ambler School of Horticulture for Women, Philadelphia.

Miss Susan Bates, of the Department of Agriculture, who is conducting a thorough research in the cotton industry in the Department's effort to find the cause of the great decrease in cotton goods demands in this country.

Percherons taking their rest day on the farm of Walter Stembel, Oxford, Indiana. The Hoosier State ranks well up among the States producing well-bred horses.

Pigs making hogs of themselves in the happiest kind of surroundings—an alfalfa field on the farm of Robert Gardner, Van Buren, Ind.

John S. Martin, Minister of Agriculture, Ontario, who has won the poultry championship at the N. Y. State Fair 21 years in succession. His farm is at Port Dover, Ontario.

M. I. Strunk, winner of the Wisconsin two-acre corn contest in four out of five years. His average annual yield was 160 bus. per acre.

The Editors Talk

—Come my friends, 'tis not too late to seek a newer world.—Tennyson.

TWO important events are to be held in June. The annual meeting of the National Fertilizer Association at White Sulphur Springs, West Virginia, June 6 to 10, and the International Congress of Soil Science, at Washington, June 13 to 22.

IN JUNE

These meetings are closely related in their objectives; a better knowledge of soil and a maintenance of soil fertility. This mutuality of interests is happily indicated by the fact that Sir John Russell, director of the Rothamsted Agricultural Experiment Station, England, will be an important speaker on both occasions. Sir John brings the fruit of a long and unusual harmony of scientific and practical knowledge, for he knows, as few men know, both the problems of the farmer and the scientist.

From Germany is coming one of the noted pioneers in experimental work, Doctor Professor Paul Wagner, retired director of the Agricultural Experiment Station at Darmstadt. Dr. Wagner has done much to develop experimental work. Of particular charm and interest are his accounts of experiments and methods of years ago, when fertilizers were little understood, and before it was known that bacteria in the soil had the power of fixing atmospheric nitrogen. Many other noted scientists are coming from Germany, Russia, the Far East, Great Britain, and other countries of Europe.

Following the Congress on June 22, an excursion will be made by the visiting scientists and others from coast to coast of America, and from Southern California to Northern Canada. Truly, with Ulysses of old, "How dull it is to pause to make an end." What magnificent contrasts are offered! From the rolling red soils of the Piedmont plateau to the gray sameness of sand and rock of the Mojave desert; from the irrigated citrus groves lying under the arid hills of Riverside, to the snow-capped Rockies of

British Columbia, and from the sweeping prairies of Manitoba to the steep-sided valleys of Pennsylvania! The excursion will last 30 days. Stops will be made to examine soil profiles and to visit agricultural experiment stations. Thirty days of crowded experience and constantly changing scenes; yet none quite like the "common" of Harpenden, or the old-fashioned streets of Darmstadt!

Probably it is too much to expect that our distinguished visitors will each return overseas feeling, "I am a part of all that I have met." Rather, after such experience, might they feel something of the questioning spirit as in Obermann, "But now the old is out of date, the new is not yet born."

Certainly, however, the meetings and excursion will define problems and crystallize view-points as nothing has done before. They will stimulate a national and international interest in soils and make for a more productive understanding between the scientists of all nations.

Much commendation is to be accorded Dr. J. G. Lipman and Professor A. G. McCall for their part in arranging the program of the Congress, and to Secretary Charles J. Brand for his part in arranging the program of the National Fertilizer Association. Great opportunities are offered. What we get out of them depends upon ourselves and no one else.

Probably the highest form of social service is found in the ordinary productive business enterprise.—T. N. Carver.

FROM the American Fertilizer, dated April 2, it is noted that 163,285 tons of fertilizer were sold in Maryland in 1926. This tonnage included about 140 different analyses and miscellaneous materials. Does good business demand them in order to sell fertilizers?

FERTILIZER ANALYSES

Let us consider a few facts. The chief influence that sells fertilizer is the price received for the crop and the yield—together, the value per acre. If more fertilizer is to be sold, the value per acre of the crop must be increased. It is to everybody's interest and advantage, therefore, to cooperate in deciding on what are the fertilizer analyses and amounts that will give the highest yield of the best quality and produce the biggest profit from the use of fertilizer.

One hundred and forty different analyses are unnecessary.

Probably many of them did not increase the yield or quality at all. This is poor business. It is very encouraging therefore to also note that there has been a decided increase in the standard brands recommended for use in Maryland; also that there has been a larger consumption of fertilizers containing over 14 per cent plant food.

There is, however, a vast amount of educational work yet to be done if fertilizer consumption is to be increased. Our individual welfare depends in a large measure on the welfare of the farmer and the rest of the fertilizer industry. We cannot afford to play a lone hand. The elimination of unprofitable analyses is one of the chief projects of the National Fertilizer Association. It should be supported much more than it is.

"In every true searcher of nature there is a kind of religious reverence."—Einstein.

POTASH

A RECENT circular published by the South Mississippi Experiment Station on cotton experiments in 1926 states, "The plat where potash has been left out during all these years went very largely to pieces in 1926 as a result of wilt. No replications were used. We have enlisted the help of bacteriologists at the A & M College in continuing this work."

The above simple statement represents vital possibilities in research work on potash problems. In the past all experimental work with fertilizers has been largely influenced by field differences in yield and growth, plainly noticeable to the eye. Economic conditions demand a new era in fertilizer research, an era of more fundamental work to determine fertilizer effects and growth relationships possibly only discernible to the trained scientist—at least during certain phases of the work.

There is a vast amount of research to be done. Indications of disease due to probable potash deficiency, have been noted not only on cotton, but on the sugar crops, legumes, corn, tomatoes, and other crops.

Undoubtedly, one contributing cause of such disease is the practice of unbalanced fertilizing. Only by long experience do countries develop the concept and practice of a balanced system of maintaining soil fertility. In parts of Europe, for instance, phosphates were used at the beginning of this century far in excess of the other elements. This unbalanced system resulted in

failure. Again, in England, the use of nitrogen alone on the hay lands in the Thames Valley, near London, resulted in a failure of that fertilizer system.

By costly experience, the lesson is learned that emphasis must be placed not on one element as a limiting factor, but on a balanced plan of maintaining soil fertility. In developing such a system much more needs to be known regarding the function of potassium in plant life. The work at the South Mississippi Experiment Station is a long step in the right direction.

> *"Take time to deliberate; but when the time for action arrives, stop thinking and go to it."—Andrew Jackson.*

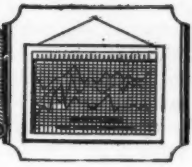
FIELD PLOT EXPERIMENTS

FIELD plots are under fire. There has been a great deal of discussion in recent years regarding the value of field plot experiments, particularly to determine the effect of fertilizers. It has been clearly shown that there is often a large error in results obtained from field plots. This has given a stimulus to experimental methods where all the factors affecting crop production are much more under control than is the case when using field plots.

As a result there is some confusion regarding the best methods to use. Undoubtedly, much of this confusion arises through the effort to combine demonstrations simple enough to convince the farmer, and technical experiments, all in the same series of plots. The pressure of the needs of the practical man is very definite. This pressure is not confined to America. It is the same in other countries where fertilizer experiments are conducted. There is an increasing urgency, therefore, for a sharp distinction between demonstration plots and purely experimental plots; the latter being small in size with many replications; the former being larger in size, less in number, simple in plan, and used to demonstrate one particular result.

Whatever the development of methods other than field plots, the general opinion of many authorities in Germany, Holland, Great Britain, and America is that the use of field plots cannot be abandoned; they have a place and an important place in soil fertility work. There is, however, an urgent necessity that demonstrations and experiments be clearly separated, mentally and physically.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

Keep Codfish Flavor Out of Broilers

The increasing practice of feeding cod liver oil to young chickens has resulted sometimes in putting on the market broilers that have an undesirable fish flavor. Because of this the Indiana Experiment Station of Purdue University is recommending that for the 2 weeks preceding marketing, broilers be fed without any cod liver oil in the ration. Experiments at that institution have shown that the flavor is gone altogether in 2 weeks. It is said the oil may be left out as soon as the poultryman begins to feed the fattening ration. It is also recommended that chickens to be kept as breeding stock be fed a ration containing cod liver oil until they can be let out in the sunshine every day. The Purdue poultry specialist says some poultrymen now feed cod liver oil all the year round but use only half as much of it when the stock is out on the range. He also says there is a great difference in cod liver oil as to vitamin content, some companies selling tested oil which is somewhat higher in price but worth it.

The Hog Walk

The hog walk is not a new dance but is actually a sidewalk that certain Iowa farmers are now using to afford a safe road for little pigs to travel from the farrowing house out to clean quarters in the open air, the idea being to protect them from worm infestation. One farmer built a sidewalk 30 feet long to carry the pigs over infested grounds and another one built a 50-foot walk. Fences on either side force the pigs to follow the walks.

Isolate Germ of Johne's Disease

Bacteriologists at the Kentucky station have succeeded in isolating and growing the germ of Johne's disease, a disease of increasing importance to owners of dairy cattle. This germ has been isolated only once before in this country, twice in Germany and twice in England. In addition to being hard to isolate it is hard to keep and grow. The organism is necessary in the production of a reagent known as johnin used in testing cattle for the disease which resembles intestinal tuberculosis.

Tobacco Responds to Right Fertilizer

W. M. Swann, of Robertson county, Tenn., with the assistance of County Agent C. H. Moody and the Chilean Nitrate of Soda Educational Bureau, obtained some striking results on three acre plots of dark tobacco. On one acre no fertilizer was used and 995 pounds of tobacco were grown and sold for $120.15. The best grade, 540 pounds, brought 16 cents a pound. On another acre, fertilized with 200 pounds of nitrate of soda, 250 pounds of 16 per cent acid phosphate, and 50 pounds of muriate of potash, 1,260 pounds of tobacco were grown and sold for $264.50. This was a gain of $144.45 over the no-fertilizer plot and the fertilizer

cost only $9.50. The best grade of tobacco, 545 pounds of it, brought 28 cents a pound. On the remaining acre, on which 250 pounds of acid phosphate and 50 pounds of muriate of potash were used, 1,045 pounds of tobacco were grown and sold for $191.05. This was a gain of $70.90 produced by fertilizer costing only $3.50. The best grade of tobacco, 695 pounds, brought 24 cents a pound.

Rye Straw, Caterpillar Hairs, and New Raspberry

The Minnesota Agricultural Experiment Station has some new and interesting information on widely different subjects. For one thing they are trying to find out what factors cause rye straw to break or, on the other hand, what ones cause it to have a good stiff backbone. These facts are of considerable importance as weak straw grain often causes farmers great losses. Although this work has not gone very far they have found that brittle rye straws contain a low percentage of crude fiber and more than the usual amount of moisture. The carbohydrates from these brittle plants are not changed into cellulose and wall-forming substances but are accumulated in other forms. This one fact opens the way for the development of rye with tougher straw.

An entomologist at the same station recently hazarded the statement that many of the so-called cases of hives and summer rash are caused by caterpillar hairs with poisonous properties. He says the creepy feeling many people have about caterpillars may be instinctive, a result of long experience. It has long been known, he says, that certain caterpillars are poisonous or have poisonous hairs or spines, but it is probable many more have these qualities.

Horticulturists at the Minnesota station recently announced the development of a new raspberry which is a week to 10 days earlier than the Latham, a very early variety previously produced at the University's fruit breeding farm at Lake Minnetonka. The new berry is less susceptible to the mosaic disease. It has not yet been named but is designated as Minnesota No. 223. It was developed from a large number of seedlings grown from self-pollinated stock of the Latham which is now an outstanding berry in Minnesota. Some stock of the new berry is now being sent out to fruit-growing stations to be tried.

"Marshalling" the Corn Yield

Ira C. Marshall of Dola, Ohio, made the best record in corn growing on 10 acres in Ohio last year. He grew 1,686.6 bushels of corn of 20 per cent moisture on his 10-acre field. He used Clarage, a medium seasoned yellow dent variety, and grew it on land along the edge of a marsh, the soil being what is commonly known as muck, underlaid at a depth of 8 or 10 inches with a heavy clay. His land was thoroughly tiled and drought resistant. Corn was grown on this land the year before and previous to that the land was in alfalfa six or seven years. Mr. Marshall plowed his land early in the spring, and this year he did his plowing for his 1927 crop the second week in March. After turning under his alfalfa sod and top-dressing the land with 200 pounds per acre of 20 per cent acid phosphate broadcast before planting, he used at the time of planting his corn 100 pounds of complete fertilizer with an analysis of 8-8-6. The prize crop of corn was planted on May 11 with hills 32 inches apart in the rows and rows 34 inches apart. The field was cultivated three times.

Foreign and International Agriculture

The purpose of this department is to help us understand the scientific, practical, and industrial agriculture of other countries and the international developments which result. The editor believes that such knowledge is now of the greatest importance in our agricultural prosperity. Every care is taken to insure accuracy—both of facts and their interpretation.

Fertilizers *for* Tropical Plants

¶ *This abstract from "Fertilizer Requirements of Tropical Plants and Soils" by Dr. A. Jacob and V. Coyle, M. Sc. contains further valuable information on the use of commercial fertilizers.*

THE number of different fertilizers offered from all sources to the farmer is legion, but, he who reads and studies these pages will be in a position to differentiate and to choose those which will be of most value to himself, for he will learn that a good fertilizer must be valued according to its content of nitrogen, phosphoric acid and potash.

The cheapest fertilizer is not the one costing the least per ton, but is that in which the nitrogen, phosphoric acid, or potash, in a form available to the plants, cost least. It is therefore necessary to know the chemical composition of a fertilizer in order to determine whether it is worth its price.

Although the organic matter present in a fertilizer is not to be considered as a plant food, it is by no means to be considered as valueless. It has a good effect on the physical character of the soil, as it augments the supply of humus. It is partly for this reason that farmyard manure is so valuable.

Farmyard manure is a complete manure containing nitrogen, phosphoric acid and potash in quantities which depend upon its origin and treatment. An average content for slightly rotted first class dung would be about 0.4 per cent N, 0.2 per cent P_2O_5, and 0.5 per cent K_2O. In tropical countries, however, we must often reckon with far lower percentages. Farmyard manure offers to the plant each of the three principal elements required for successful growth.

In consequence of its high percentage of organic matter it exercises a very beneficial effect on the structure of the soil, and also on the bacterial life. The planter should therefore endeavor to avail himself of all the farmyard manure at his disposal, by collecting and keeping it very carefully. A drawback of farmyard manure, however, is that if not properly kept, it may introduce germs of diseases into the plantation.

In some districts *human excrement* is used in the form of night soil and although the composition of this is not quite so favorable

as farmyard manure, it may be regarded as a good complete manure.

In order to keep down the expenditure upon fertilizers, attention should be given to the utilization of all *refuse of the plantation* in the form of *compost*. Weeds and crop refuse should be heaped together and mixed with lime which accelerates their decomposition. The manurial value of compost is increased very materially if phosphatic fertilizers and potash salts are mixed with the heap, at the rate of 1/2 cwt. muriate of potash, and 1/2 cwt. basic slag to the cubic yard. Compost is used to the greatest advantage when applied to the seed beds. The danger of introducing weeds and pests into the plantation also has to be considered when using compost.

Owing to the comparative scarcity of farmyard manure on tropical plantations, often the only way the planter has of enriching the soil in humus is to grow *green manure* crops of the leguminous family and to plough them under. This practice is very beneficial on stiff clays and on light sandy soils, as the introduction of organic matter helps to loosen the texture of the former and to bind the latter, thus improving the physical condition of both types of soil. By growing green crops between the main crops, instead of letting the land lie fallow, the planter can keep his soil free from weeds and protect it from the leaching action of the heavy rains.

Besides adding humus to the soil, green manuring also enriches the soil in nitrogen. This is a very great advantage to the planter, especially since nitrogen is the most expensive plant food, costing four or five times as much per unit as either potash or phosphoric acid. The gaseous nitrogen, which forms 4/5 of the atmosphere is valueless as far as the nutrition of plants is concerned, since they cannot make use of it in this form. The legumes (e.g. peas, beans, clover, alfalfa, etc.) however, are an exception to this general rule. On the roots of leguminous plants are nodules containing bacteria, which while living as parasites and feeding on the carbohydrates provided for them by the plant, fix the nitrogen of the atmosphere and convert it into suitable plant food for their

Hawaii—Sugar cane from 1-40 of an acre. No fertilizer was applied here. This plot adjoins the one pictured opposite

host.

It has been calculated that a good green crop brings more nitrogen into the soil than a good dressing of nitrogen fertilizer. As a source of nitrogen, green manure has the further advantage that it yields a steady supply of nitrogen at the rate at which the latter is required by the main crop, because the time during which the crop grows most vigorously and requires large supplies of plant food coincides more or less with the period when the soil bacteria are most active in converting the organic matter of the decaying green crop into available plant food. It is therefore evident that green manuring is not only the best way of improving soils which are lacking in humus, but is also an economical and efficient means of enriching the soil in nitrogen.

To the class of organic fertilizers also belong *pressed cakes* made from oil seeds during the oil extraction. The quantity of organic matter brought into the soil by applications of cake is not very high, nor are cakes a complete manure. They give chiefly a one-sided manuring of nitrogen, present in the form of albuminoids, which although in a form not immediately available to the crop is transformed by bacteria into the nitrate. Its absorption by the plant is dependent upon the velocity with which the cake is decomposed by the bacteria of the soil.

Such manures will not exercise so rapid an effect as mineral manures but this is not necessarily a disadvantage, since for perennial crops such as tea, rubber, and coconut, it is of great advantage to have a fertilizer which will act in a gradual and lasting way. The most important of these are *soya bean cake, castor cake, rape cake, cotton cake.*

Of a similar effect are some by-products of animal origin which are of importance chiefly as sources of nitrogen and phosphoric acid; among these are *dried blood, tankage, bone dust, and fish meal. Guano,* though of organic origin, is, in most cases, already more or less mineralized, being of the fossilized excrement of birds or bats. The best of the Peruvian guanos contain nitrogen and phosphoric acid, but most of other guanos contain only phosphate in a rather insoluble form, and are to be considered more or less as rock phos-

Hawaii—Sugar cane from 1-40 *of an acre. Complete fertilizer was applied here at the rate of* 1,200 *pounds per acre*

phates, which require treatment with sulphuric acid to render them soluble.

The planter must always remember that cakes and by-products generally are not complete manures and being one-sided, they must be supplemented by the addition of some of the following mineral fertilizers, so that the plant may be provided with all the necessary plant foods in the right proportions.

The *mineral fertilizers* themselves are one-sided fertilizers and may be classed as nitrogenous, phosphatic, and potassic.

The undernoted are the chief *nitrogenous fertilizers* in present day use:

	% Nitrogen
Sodium Nitrate containing	15.5
Calcium Nitrate containing	13.0
Leuna Salpeter (Ammonium Sulphate Nitrate) containing	26.0
Ammonium Sulphate containing	20.5
Nitrolim containing	18.0
Synthetic Urea containing	46.0

The nitrates of soda and of lime, also in part ammonium nitrate, contain the nitrogen in the form of nitrate, the form in which it is absorbed by the plant. In temperate climates this is very much in favor of these fertilizers, because the effect is thereby quicker and surer than that of the other nitrogenous fertilizers, the nitrogen of which must first be converted to nitrate by the bacteria of the soil.

In the tropics, however, this advantage seems to be of hardly any importance because there nitrification proceeds so rapidly that no objection can be made to sulphate of ammonia or nitrolim. It may even be that some crops benefit more from nitrogen in the form of ammonia.

Moreover, as sulphate of ammonia is not so easily washed out as nitrate, in tropical agriculture it is often preferred to sodium nitrate.

As sources of *phosphoric acid*, in addition to the more or less mineralized forms of guano, the following phosphatic fertilizers are very much used:

1. Superphosphate containing 14-21% water soluble P_2O_5
2. Double Superphosphate containing 35-45% water soluble P_2O_5
3. Basic slag containing 16-20% citric soluble P_2O_5
4. Rhenania Phosphate containing 25-30% citrate soluble P_2O_5
5. Ground Rock Phosphate containing 25-35% insoluble P_2O_5

Basic slag because of its lime content is alkaline in reaction and is therefore preferred on acid soils where the use of superphosphate might be dangerous. Rhenania Phosphate contains about 25-30 per cent P_2O_5 in a rather easily assimilable form.

Fertilizers containing at the same time nitrogen and phospohric acid in chemical combination are:

Leunaphos (20% Nitrogen and 15% Phosphoric acid)
Diamonphos (19% Nitrogen and 47% Phosphoric acid)
Ammophos (20% Nitrogen and 16% Phosphoric acid)
Ammonia Superphosphate (9% Nitrogen and 9% Phosphoric acid).

The third important class of fertilizers is the *potassic* containing potash in a form soluble in water. These are:

1. Sulphate of Potash 90-96% pure, containing about 48-52% pure potash.
2. Muriate of Potash 80-85% pure, containing about 50% pure potash.

Sulphate of Potash, on account of the absence of chloride, is generally preferred for the manuring of crops rich in sugar or starch and

(*Turn to page* 47)

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

Fertilizer bulletins this month are chiefly reports of analyses and inspections:

"Analyses of Commercial Fertilizers," Ky. Agricultural Experiment Station, Lexington, Ky., Bul 263, *Dec.* 1925. *H. E. Curtis. H. R. Allen and Lelah Gault.*

"Official Inspections 121," *Maine Agricultural Experiment Station, Orono, Me., Oct.* 1926, *James M. Bartlett.*

Official Inspections, 122" *Maine Agricultural Experiment Station, Orono, Me., Dec.* 1926.

"1926 *Fall Report," State Department of Agriculture and Division of Chemical Laboratories, Lansing, Mich., Bul.* 47.

"Responses of the Sour Cherry to Fertilizers and to Pruning in the Hudson River Valley," N. Y. State Agricultural Experiment Station, Geneva, N. Y., Bul. 541, *Jan.* 1927, *H. B. Tukey.*

"Report of Analyses of Commercial Fertilizers Sold in New York State," Agricultural Bulletin, Dept. of Farms and Markets, Albany, N. Y., Bul. 195, *Oct.* 1926.

"Nitrogenous Fertilizer Materials," Tenn. Agricultural Experiment Station, Cir. 9, *Feb.* 1927.

"Commercial Fertilizers," Vt. Agricultural Experiment Station, Burlington, Vt., Bul. 258, *Sept.* 1926, *C. H. Jones, G. F. Anderson and E. F. Boyce.*

Department of Agriculture and Immigration of Virginia Bul. 231, *Mch.* 1927.

"Official Fertilizer Inspection for Wisconsin," Wis. Department of Agriculture, Madison, Wis., Mch. 20, 1927, *W. B. Griem.*

Soils

Soil reports from three Illinois counties which have just been distributed are:

"Rock Island County Soils," Ill. Agricultural Experiment Station, Urbana, Ill., Soil report 31, *June* 1925, *R. S. Smith, O. I. Ellis, E. E. DeTurk, F. C. Bauer, and L. H. Smith.*

"Randolph County Soils," Soil report 32.

"Saline County Soils," Soil report 33.

Crops

In line with last month, a great number of publications dealing with crops and their culture have come to the editor's desk. Two interesting treatises of potato growing are particularly noted, one being "Potato Growing in Colorado," Bul. 314 of the Colorado Experiment Station. The author, E. P. Sandsten, particularly emphasizes the fact that the use of potash and phosphorus fertilizer in some form must sooner or later be resorted to in the successful production of potatoes. He states that potash and phosphoric acid are utilized in considerable quantities by the different crops grown in rotation and when none is added to the soil there is a constant reduction in the amount of potash and phosphorus available for plant food. This fact should convince any grower that the rotation of crops and the plowing under of alfalfa will not maintain production nor prevent the land from becoming depleted of plant food. The bulletin deals very generously with problems of varieties, cultivation, diseases, and storage.

The other bulletin, "Better Potatoes for Michigan," Ext. Bul. 49, by H. C. Moore, while more condensed, presents in tabulated form a similar full and complete treatment of the subject. This bulletin is particularly handy for the ready reference of a busy farmer.

Other crop bulletins include:

"Lettuce," University of California,

Berkeley, Cal., Cir. 5, No. 1926, H. R. Wellman.

"Cantaloupes and Honey Dew Melons," Colorado Experiment Station, Fort Collins, Colo., Bul. 312, Nov. 1926, N. D. Sanborn.

"Bulbs," Fla. Agricultural Experiment Station, Gainesville, Fla., Press Bul. 394, Mch. 1927, Harold Mowry.

"Germination and Storage of Apple Seeds," Iowa Agricultural Experiment Station, Ames, Iowa, Research Bul. 97, A. L. Bakke, H. W. Richey and Kenneth Reeves.

"Inheritance of Carbohydrates and Fat in Crosses of Dent and Sweet Corn," Iowa Agricultural Experiment Station, Ames, Iowa, Research Bul. 98, Nov. 1926, E. W. Lindstrom and Fisk Gerhardt.

"Annual Report for Fiscal Year Ending June 30, 1926," Iowa Agricultural Experiment Station, Ames, Iowa.

"Profitable Oat Production in the Upper Peninsula of Michigan," Michigan State College, East Lansing, Mich., Ext. Bul. 50, Feb. 1927, C. E. Skiver.

"Varieties and Locations as Factors in Apple Production," Mich. Agricultural Experiment Station, East Lansing, Mich., Spec. Bul. 161, Jan. 1927, V. R. Gardner.

"The Quarterly Bulletin," Agricultural Experiment Station, Michigan State College, East Lansing, Mich., Vol. 9, No. 3, Feb. 1927.

"Report of the Northeast Experiment Station, Duluth, 1924 and 1925," Minn. Agricultural Experiment Station, St. Paul, Minn.

"Alfalfa Investigations," Neb. Agricultural Experiment Station, Lincoln, Neb., Research Bul. 36, Dec. 1926, T. A. Kiesselbach and Arthur Sanderson.

"Preliminary Report on the Growing and Marketing of Fresh Tomatoes in New Mexico," N. M. Agricultural Experiment Station, State College, N. M., Bul. 157, Jan. 1927, A. B. Fite.

"Plans and Score Card for Negro Garden Contests," N. C. State College of Agriculture and Engineering and U. S. D. A., State College Station, Raleigh, N. C., Ext. Folder 25, Jan. 1927, C. R. Hudson.

"Crop Rotations for the Coastal Plain Section of North Carolina," N. C. State College of Agriculture and Engineering and U. S. D. A., State College Station, Raleigh, N. C., Ext. Cir. 165, Feb. 1927, E. C. Blair.

"Spring Wheat," Crop Talk, Ohio State University, Columbus, Ohio, No. 41, Feb. 1927, Wallace E. Hanger.

"Forty-fifth Annual Report," Ohio Agricultural Experiment Station, Wooster, Ohio, Bul. 402, Feb. 1927.

American Potato Journal, Washington, D. C., Vol. IV, No. 3, Mch. 1927.

"A Select List of Varieties of Farm Crops," Tenn. Agricultural Experiment Station, Knoxville, Tenn., Cir. 10, Feb. 1927, C. A. Mooers.

"Alfalfa and Sweet Clover Culture," Tenn. Agricultural Experiment Station, Knoxville, Tenn., Cir. 12, Mch. 1927, C. A. Mooers.

"Effects of Planting Soybeans and Cowpeas with Corn," Tenn. Agricultural Experiment Station, Knoxville, Tenn., Cir. 13, Mch. 1927, C. A. Mooers.

"First 20 Years of a Variety Apple Orchard; Apple Cion Selection," Vt. Agricultural Experiment Station, Burlington, Vt., Bul. 255, Aug. 1926, M. B. Cummings and E. W. Jenkins.

"Thirty-ninth Annual Report," Vt. Agricultural Experiment Station, Burlington, Vt., Bul. 260, Oct. 1926, J. L. Hills.

Economics

With Massachusetts producing two-fifths of the commercial apples grown in New England, the new bulletin, "The Market Outlet for Massachusetts Apples," Bul. 231, by Lorian P. Jefferson, should prove of marked value to a great many Massachusetts farmers. The study points out that the demand for eating apples is growing faster than that for the cooking varieties, also that the demand for good apples in uniform size increases. If the United States is to hold her place as an exporter it will be done by meeting these demands better than they can be met by apples from other sources.

"Farm Economics," Alabama Polytechnic Institute, Auburn, Ala., Vol. II, Nos. 7 and 8.

"Illinois Crop Report for March 1, 1927," U. S. D. A. and Illinois D. of A. Cir. 362.

"Michigan Farmers' Tax Guide," Mich. Agricultural Experiment Station, East Lansing, Mich., Cir. Bul. 100, Jan. 1927, R. Wayne Newton.

"The Farm Real Estate Situation 1926," Dept. Cir. 377, U. S. D. A., Washington, D. C., Feb. 1927, E. H. Wiecking.

"Cotton Prices and Markets," Dept. Bul. 1444, U. S. D. A., Washington, D. C., Dec. 1926, Alonzo B. Cox.

Diseases

"Barberry Eradication and Sources of Black Stem Rust in Colorado," Colorado Agricultural College, Fort Collins, Colo., Bul. 315, Jan. 1927, L. W. Durrell and E. A. Lungren.

"The Influence of Plant Injury and the Root Rot Diseases Upon the Physical and Chemical Composition of Corn Grain," Ill. Agricultural Experiment Station, Urbana, Ill., Bul. 284, Dec. 1926. George H. Dungan.

"Holcus Bacterial Spot of Zea Mays and Holcus Species," Iowa Agricultural Experiment Station, Ames, Iowa, Research Bul. 100, Nov. 1926, James B. Kendrick.

"Pectic Constituents of Peaches and Their Relation to Softening of the Fruit," Md. Agricultural Experiment Station, College Park, Md., Bul. 283, July, 1926, C. O. Appleman and C. M. Conrad.

"Fruit Rotting Sclerotinias; III Longevity of Buried Brown-Rot Mummies," Md. Agricultural Experiment Station, College Park, Md., Bul. 284, Oct. 1926, Walter N. Ezekiel.

"Control of Seedbed Diseases of Cruciferous Crops on Long Island by the Mercuric Chloride Treatment for Cabbage Maggot," N. Y. State Agricultural Experiment Station, Geneva, N. Y., Bul. 537, Nov. 1926, E. E. Clayton.

"Dwarfing, Shriveling, and Dropping of Cherries and Prunes," N. Y. State Agricultural Experiment Station, Geneva, N. Y., Bul. 540, Dec. 1926, W. O. Glover.

Insects

"Two Currant Aphids," Maine Agricultural Experiment Station, Orono, Me., Bul. 336, Jan. 1927, Edith M. Patch.

"The Pea Aphid in Maine," Maine Agricultural Experiment Station, Orono, Me., Bul. 337, Feb. 1927, Edith M. Patch.

"A Progress Report on the Investigations of the European Corn Borer," Dept. Bul. 1476, U. S. D. A., Washington, D. C., Feb. 1927.

* * *

Fertilizers for Tropical Plants

(*From page* 44)

also for tobacco,—for high class tobaccos the higher grade 96 per cent sulphate, which has a guaranteed maximum content of 1 per cent chlorine, is generally prescribed.

Another salt, Sulphate of Potash-Magnesia, which contains about 26 per cent of pure potash, is much favored in European agriculture, because of its content of magnesia which according to modern investigation is also an important plant food. The good results obtained in Europe have led to its being tried in the tropics, but on account of its lower content of potash, and relatively high freight, it is less economic compared with, say, Sulphate of Potash.

The *crude potash salts* contain about 12-15 per cent pure potash, in the form of Muriate of Potash plus varying quantities of sulphate of magnesia and rock salt. Though these crude salts have been used with good results in Europe, freight makes their use in the tropics very costly. Kainit, however, is preferred by American cotton planters and also for the manuring of coconuts, as the coconut palm is very responsive to a dressing of Kainit containing salt.

Nitrate of Potash has the disadvantage that, in addition to the potash, a certain quantity of nitrogen in the form of the expensive nitrate must be bought. In experiments conducted in Java, the addition of Nitrate of Potash to oilcake depressed the manurial value of the cake, so that the manufacturers had to stop the practice of mixing oilcake and nitrate. Further, the negative results, which many potash experiments have given when potash was applied as nitrate, seem to indicate that nitrogen in this form reacted against the good effect of the potash.

Another potash fertilizer which seems cheap is *Wood Ash*. Its great disadvantage, however, is its varying composition and its low potash content of 2-10 per cent potash (K_2O) which naturally means high cost of transport. It has been observed in certain experiments, that after a dressing of Wood Ash a strong growth of weeds was promoted, the destruction of which requires a great outlay. The check plots manured with Sulphate of Potash did not exhibit the same phenomenon.

As has already been pointed out, all these fertilizers are one-sided. In order, therefore, to provide a complete fertilizer, it is necessary to give them in combination as previously discussed. The mixing may be done by the planter himself or he may buy a mixture ready made up from a reliable firm.

If the planter does the mixing himself, he will naturally save something on the cost of mixing,

but he must be careful not to mix together substances which are incompatible. Such a mixture would lead to loss of nitrogenous elements or to reactions resulting in caking. As a rule it may be stated that lime or basic slag must not be mixed with Sulphate of Ammonia or nitrogenous organic manures, because the caustic lime in them would lead to losses of nitrogen; furthermore, lime and basic slag should not be mixed with superphosphate, because the water soluble phosphoric acid of the latter would combine with the lime and form insoluble phosphates which are of much less manurial value. All the other fertilizers may be mixed. It is, however, to be recommended that the mixing be done only a short time before using in order to avoid any possibility of caking.

The mixing is done by spreading one fertilizer on a hard surface and then distributing the second evenly over the first. By working the two together with a shovel a good mixture is obtained. If three are to be mixed, it is better first to mix two and then add the third to the mixture.

Where the planter prepares his own compound fertilizer, he has the advantage of knowing exactly its composition. A great number of perfectly reliable firms exist which sell their compound fertilizers under guaranteed analysis. Most of these firms mix by machinery and are so able to offer very uniform mixtures at little extra cost. Consequently most planters prefer to buy their fertilizers ready mixed. Where planters are in touch with reliable firms, they are recommended to buy from these, but in every case they should ask for the analysis, and make certain that they do not get a mixture from an obsolete formula, containing say only nitrogen and phosphoric acid, but one also containing, in accordance with the demands of theory and practice, at least 4-15 per cent potash.

* * *

From Humans to Plants

(*From page* 19)

instance, he has cleared a woody hollow, through which runs a brook, of the tangle of worthless blackberry vines that formerly choked it. And along the run he has set out at close intervals filberts that should give big yields in a few years. He has set out dozens of the native blueberry plants and grafted them with scions of the improved, big blueberries. He has shown the possibilities inherent in a few acres of wild mountain land. When all his trees and berries are in bearing, there will be a nice harvest for some one.

But the big thing Dr. Zimmerman has done is to immunize the chestnut. Strangely enough, he is an apostle of immunization. He has practiced immunization in his medicine to an extent not dreamed of by the average physician. He has been studying relative immunity and ways of immunizing since fire blight took away his favorite pear tree when he was a boy on his father's farm, and left the other trees untouched. So when he found himself out among the dying chestnuts, his heart went out to them, and he believed he had a great opportunity before him.

FROM pustules of diseased chestnut trees he scraped material with which he prepared an antigen, and which he injected into many young, blighted trees. He made x-shaped incisions in the bark,

packed the openings full of his antigen, bound them up with surgeon's tape to prevent loss of the immunizing fluid.

In every case the tree treated sickened visibly. The yellowing foliage grew yellower, it became limp, the whole tree looked sick—as it was sick. But the antigen caused the tree to create within itself protective ferments, to begin to immunize itself. After a while the limp leaves stiffened, the yellow leaves looked less yellow, then took on a bright green, then grew altogether vigorous and healthy looking. But that was only a start. In every case—and dozens of trees were treated—the real disease with which the tree was suffering was stopped!

Chestnut blight begins at a pin point of infection and spreads in every direction. In the treated trees it spread no more. It stopped spreading—absolutely. The doctor repeated his treatments. And wonder of wonders! The dead, blighted areas of bark began to be covered with new, healthy tissue.

DR. ZIMMERMAN is entirely satisfied that he has conquered the blight. And any one who sees these rejuvenated trees, as I have seen them, can hold no other opinion. But Dr. Zimmerman has no time to make exhaustive tests. He wants to accomplish something before he dies. And the big thing he has in mind is the creation and immunization of a better chestnut than has ever yet existed.

Here and there, throughout the country, were superchestnuts—trees that yielded mammoth nuts of remarkable quality. Most of these trees are dead. But there is still life in stump or root, and suckers or shoots come up. Dr. Zimmerman wants to get living wood from these super-trees, graft it on his seedlings, test out the nuts—he can make them bear in two years—and cross-breed from the best, thus getting finer chestnuts than have ever yet existed. Then he will make trees from these superior sorts, immunize them, and so give to the world a superior nut tree.

THERE is no money in it for Dr. Zimmerman. It will take years to accomplish this, if he lives so long. He has nothing but a slender pension to live on, and he is spending that to prosecute this work. He needs help badly—not dollars and cents, but information as to where these grand old trees were. If anyone knows of one, writing to Dr. Zimmerman, at Piketown, Pa., and telling him about it will greatly aid the doctor. He will make some arrangement to get wood from it, if wood is still to be had.

Meantime the stricken physician is "carrying on." He has been a dweller in the woods now for six years. He can't help humanity as physicians like to help, but he is doing what he can under the circumstances. Maybe he is doing more than he could in the usual way, for when it is shown beyond question that he has stopped the blight, other men will apply his methods and do for fruit trees what he has done for the chestnut.

Soil Potassium

(*From page* 8)

been produced on the soil which receives phosphorus, especially when potash also has been applied. The acid-soluble potassium content of uncultivated Strongsville soil is 100 pounds per acre as compared with 88 pounds for the

TABLE 3.—Soluble Potassium. 5-year Rotation Fertility Plots

Plot	Fertilizer treatment, 5-year period, pounds per acre	Potassium pounds per acre Limed	Unlimed
1	None	46	68
2	Acid phosphate, 320	34	74
3	Muriate potash, 260	72	154
4	None	46	74
5	Nitrate soda, 480	46	62
6	Acid phosphate, 320; nitrate soda, 480	34	64
7	None	56	72
8	Acid phosphate, 320; muriate potash, 260	60	120
9	Muriate potash, 260; nitrate soda, 480	64	152
10	None	46	68
11	Acid phosphate, 320; muriate potash, 260; nitrate soda, 480	62	122
18	Manure, 18 tons	68	104
19	None	54	62
24	Acid phosphate, 480; muriate potash, 260; ammonium sulphate, 165	68	102
25	None	52	74

limed soil, and 72 pounds for the phosphated soil. The soluble potassium in limed soil from the plot fertilized with muriate of potash is 156 pounds and in the phosphated soil from this plot 94 pounds.

Liberation of potassium.—Various agencies operate to release potassium from soil-forming minerals, but the amount at the disposal of a crop during its growth is a comparatively small proportion of the total reserve supply. It is estimated from the average composition of the crops grown in the 5-year rotation at Wooster that 160 pounds of potassium is removed in 5 years from the unlimed soil and 200 pounds from the limed soil on Plot 11, which receives acid phosphate, muriate of potash and nitrate of soda in the fertilizer treatment. This amount exceeds by 70 pounds the amount of potassium supplied by the muriate of potash added during the same period.

IT has been asserted that the application of certain materials including gypsum and nitrate of soda may cause the liberation of potassium from the more insoluble forms in the soil. Tests of several soils treated with calcium sulphate, ammonium sulphate, and sodium nitrate and allowed to stand for some time previous to extracting the water, furnished the results in Table 4. The materials were mixed with the soil at the following rates: ammonium sulphate, 200; sodium nitrate, 400; and calcium sulphate, 800 pounds per acre. These additions all appear to have slightly increased the solubility of potassium in most of the soils treated.

TABLE 4.—Effect of Salts on Solubility of Potassium—Water Soluble Potassium in Pounds per Acre

	Calcium sulphate	Sodium nitrate	Ammonium sulphate	Water only
Silt loam, no treatment	18	30	26	14
Silt loam, limed	12	16	14	10
Silt loam, acid phosphate	12	14	14	10
Silt loam, acid phosphate, lime	12	14	10	8
Silt loam, muriate of potash	34	40	44	28
Silt loam, muriate of potash, lime	14	16	14	14
Paulding clay, uncultivated	30	26	30	24
Paulding clay, unfertilized	24	22	30	20
Trumbull clay loam, uncultivated	30	34	42	16
Trumbull clay loam, unfertilized	18	30	34	16

Blueberries

(*From page 22*)

acre orchard of seven-year-old trees valued at $40,000, at least, this was the price offered and refused.

Walton county has an old orchard planted with 300 trees to the acre, some of them yielding 40 quarts a year. In near-by Washington county there are large and small orchards aggregating 1,450 trees now bearing, and 2,100 trees that have not yet reached the bearing age. Farther down the peninsula, Bradford county has made a start with an acre already planted to blueberries as an experiment.

What is there in blueberry culture? Just what care or lack of care, judgment or lack of judgment makes it. The average wholesale price obtainable ranges from 20 to 25 cents, though some superior berries have been marketed in Chicago at 42 cents a quart. The younger trees, trees from 4 to 8 or 9 years of age will yield from 10 to 15 quarts per year. After that time the yield increases rapidly to as high as 30 or 40 quarts. With planting at 300 trees to the acre the return from an 8 or 9-year-old orchard should be about 3,000 quarts a year. From an old-timer with trees 25 to 30 years of age, returns as high as $1,500 an acre are possible. Indeed, the only really old orchard, the Sapp orchard with trees 33 years old, yields practically that sum every year, so the manager told me.

This sums up Florida's efforts to supply us with blueberries in and out of season in order to relieve us of the back-breaking pasture experiences when the urge for a piece of luscious blueberry pie is on. However, the total result in quarts from the acreages now in bearing doesn't go far toward appeasing the national appetite. A start has been made, nevertheless, by determined people who know the game and have the ability to "follow through." It may not be many years before we shall be able to have all the blueberry pies, blueberry griddle-cakes and blueberry muffins we want both in and out of season, at a price something less than 50 or 75 cents a quart.

* * *

New England Pastures

(*From page* 13)

weeks and the good pasture season about 10 or 12 weeks.

Nearly every farm pasture has an area that can be tilled. Here is a good place for sweet clover. If no part of the pasture is available, a mowing field can be turned temporarily into pasture, or sweet clover can be used in the rotation.

Sweet clover can be grown in old pastures. Sour land must be limed for the crop and on such soils available plant food must be supplied. Phosphorus in soluble form seems to be necessary on most soils to aid bacterial action and for the growth of the plants. New England soils which are formed from the original boulder clay of the ice age seem to require little additional potash, but where the soil has been reworked and stratified in old lake beds or

river terraces and on very sandy soils, potash is important and may take precedence over phosphorus as the most necessary element. Available nitrogen seems to be important in starting the crop. Manure shows striking results on these worn pasture soils.

A reasonable fertilizer practice in undertaking to grow sweet clover on such fields would be to use a balanced fertilizer, unless the particular needs of this crop had been worked out for the soil type in an experimental way.

Plowing the soil before liming is preferable, but if that is not possible, lime can be spread on the old sod and disked in. If the land has been plowed or disked and limed in the fall, the seed should be sown as early as possible after the snow goes off and while the ground is still honeycombed with ice crystals in late winter or early spring. Land not prepared in the fall should be fitted and seeded in early spring to allow the young plants to get well established and to furnish the maximum amount of pasturage that year. The fertilizer should be broadcast at seeding or as soon after as practicable. A nurse crop is not advisable on an infertile soil.

Once a field has been limed and has grown sweet clover successfully it may be handled as a permanent sweet clover pasture by allowing some of the plants to go to seed in the fall of the second year, or by reseeding in the spring of the third year on top of the frozen ground, with due attention to the fertilizer needs of the crop. The area should be limed as often as necessary, probably every six or eight years.

Sweet clover, with its abundant pasture, its hardy characteristics, and its rugged habits of growth, offers much hope to farmers in New England and elsewhere who are beset with high feed costs and poor pastures during the summer and fall months.

* * *

W. E. Spreiter

(*From page* 12)

before it. It was already time for the program to start, so it was too late to borrow a team to try to make it by wagon. The only thing left to do was to break his record of 14 years' standing and give up the attempt. Never before nor since has he disappointed his audience by failing to make his appearance. Most county agents know what it is to drive their automobiles over well nigh impassable roads in all kinds of weather so perhaps we touch a responsive chord by mentioning bad roads as one of the reasons why many of them give up their positions to go out and farm for themselves.

In addition to being a county agent, Spreiter is a director in a farmers' bank and a rather large landowner as well. Because he owns four farms totaling 720 acres in size, he is acquainted with the farmers' problems from a managerial standpoint. That is perhaps one reason why he has been so fortunate in putting his program of better agricultural conditions across. Having had experience with lime and alfalfa on his own farms, he has been able to push the alfalfa program with more fervor. Today there are in Wisconsin hundreds of fields of that famous legume that directly or indirectly owe their existence to his advice and counsel. Lime,

inoculation, and fertilization all have received their just share of attention, until it is a never ending source of inspiration to ride through the beautiful La Crosse county valleys and see field after field of legumes growing up to feed the dairy cows.

Spreiter looks upon the fertilizer problem with an open mind, but he is getting much attention centered on the question. Two years ago a considerable number of farmer-conducted experiments with fertilizer were made in the county. One of the commercial companies shipped a half ton of several different grades to be used in demonstration work. Spreiter says concerning this shipment, "It was turned over to Professor Hembre of the Mindora high school, who got three farmers to use it according to instructions, with the understanding that they were to give a report on the results. In all cases a noticeable increase in growth could be seen in the fields, and the yields were increased enough so the users are convinced that it did good."

Through the efforts of the agricultural teacher at West Salem, soil surveys were made on several farms in the vicinity. In most of these cases a need for lime was discovered. With the assistance of the West Salem Canning Company, two car loads of commercial fertilizer were used on peas. Spreiter says, "One farm reported that the treated field yielded about double the untreated one right beside it. Some of the others showed very good results, and still others were not so good. Some of the poor results, however, may have been due to faulty placement of the material."

Spreiter finds that many farmers are not yet "sold" on the practicability of applying liberal amounts of fertilizer, especially with prices for farm products what they are now. Because of this he is approaching the problem in a more cautious and slow, but what he considers, a surer way. To quote his own words, "We have pointed out the value of fertilizers at many meetings, but we have not advocated wholesale ap-

One of the houses planned and built under W. E. Spreiter's direction

plication until the farmers know and understand more about their use. What we want is to get the farmers to make tests on their own farms and in their own way without having any one watching them. We are asking, however, that they leave some check plots so the yields from the fertilized and unfertilized areas may be compared.

"AT the farmers' institute last winter 30 new farmers who before had never used any other fertilizer than lime signed up to make some experiments in a small way in their own fields. They did not agree to take a large amount, nor do we want them to do so until they have proved to themselves that it will pay them. Since in this way they do not have much invested, many of them do not expect much of any returns, so if the yields are appreciably increased they will want to try more next time. Moreover, if little improvement can be seen for their particular farms, they will not lose much by making the trial.

"There are a number of farmers around Bangor who started using commercial fertilizer in this way a few years ago, and they are now applying it as a regular thing. Their neighbors are seeing results accomplished before their eyes, so they too will probably be using some fertilizer in the near future. We believe that this method of gradually educating the farmer in its use and letting him grow into it is better than risking a failure by starting in with it on too large a scale to begin with."

Spreiter did not get accurate yield figures on the various fertilized plots that were tried by the farmers themselves last summer, but he says that one of the most outstanding results brought out by them was the earlier maturing of the fertilized plots. He said, "The four farmers in Burns township who used fertilizer all had matured corn last fall, but all of their neighbors had soft corn. Another example that I might name is that of John Hatch, a farmer near Bangor. He cribbed a sound crop but his neighbors had to be satisfied with frosted corn. Nearly every one who used fertilizer had about the same report to make, and it was mostly on corn that phenomenal results showed up. This year being late, wet, and cold, however, was an especially favorable one for fertilizer in this county. Another year might not be so good. We did not get so many figures this year as we would have liked, but next year we are going after it under the Griffith Richard's soil improvement plan in cooperation with the Wisconsin College of Agriculture. Seventeen farmers have already signed up for this, and we expect many more will do so."

SPREITER has taken an active part in organizing and aiding cow testing association work. For some years now he has been secretary of the Holmen Association, which is not only the oldest active testing association in the State, and the third oldest in the United States, but holds the state record in number of herds averaging more than 300 pounds of fat per cow. Thirty-three of the thirty-five herds in the association are listed in that classification. There is probably no other testing association in America that can show so high a percentage of herds averaging more than 300 pounds fat in a year.

For the last few years La Crosse county has been one of the most successful contenders for honors in the various state farm crops

shows. That the farmers are learning how to produce better crops, is shown by the fact that they won state honors at the 1925 Wisconsin State Fair and repeated the feat last summer. Many of the ribbons at the International Grain Show at Chicago are garnered by men who come to W. E. Spreiter for advice. Of the 71 premiums awarded to Wisconsin exhibitors at the 1926 International, 14, or almost one-fifth, were won by farmers from the Gateway county. For two years in succession now the silver trophy that is awarded to the county winning most premiums at the Wisconsin Winter State Corn and Grain Show has been carried away by La Crosse county. One of the interesting things in connection with these winnings is the fact that most of the showmen are sold on the program of supplying their soils with the proper fertilizers at the time they need them. Jippa Wiellinga, that beloved old showman who was one time runner-up in the state two-acre corn yield contest, was one of the first men in the county to use commercial fertilizers. He carried the idea with him from Holland, but many of the younger showmen have acted upon the advice of their county agent and followed the example that this pioneer set.

* * *

Washington

(*From page* 16)

of poultry and dairy cattle, soils, crops, and horticulture. This Station has given much attention to problems of the poultry, dairy, and berry industries in western Washington. Crop and soil problems also have been emphasized, and pastures have been studied in recent years. D. A. Brodie, W. H. Lawrence, Geo. Severance, and W. A. Linklater, have successively acted as superintendents of this Station.

The first Experiment Station bulletin was published in 1891. Since that time more than 200 general Station bulletins, 131 popular bulletins, and some 150 to 200 papers in scientific journals have been published, all of them dealing with problems of the agriculture of a State of great diversity.

There is a wide variation in the climatic and soil conditions in the agricultural districts of the State of Washington, and as a result agricultural practices must be different in different localities. The precipitation for the entire State occurs largely in the fall, winter, and early spring, and moisture is a limiting factor in crop production for large parts of Washington. The water requirements of different field crops have been determined and this information has been a direct benefit in ascertaining the cropping possibilities for both dry land and irrigation farming.

From one-fourth to one-third of the farm land in the wheat growing districts is in summer fallow each year and the best means of handling these summer fallow areas, in order to make plant food available and conserve moisture, have been extensively studied. In these same areas, wheat following alfalfa or clover is subjected to burning which frequently results in a reduction of the yield. Investigations have proved that burning may be overcome by applying a small quantity of straw on the legume land and plowing it under.

or applying it after the land has been plowed and disking it in.

It has been shown that the bacteria which cause the straw to rot require nitrogen for their growth and since the straw contains but little nitrogen they use the excess of this element present in the soil. Straw spread on the land in this manner utilizes and retains temporarily the excess of available nitrogen, and prevents the abnormal crop growth in the early spring which frequently results in burning.

Crop rotation experiments are in progress which show the effect of different crops upon those which follow and also the results in acre yields when summer fallow is replaced by a legume such as field peas or a cultivated crop of corn or sunflowers. In order to extend the use of legumes and give greater assurance to their successful production, bacteria culture for their inoculation has been distributed at cost to farmers in all parts of the state.

During the early period of wheat growing in the State, the wheat varieties sown were often not suited to the districts in which they were used. Much of this acreage has since been devoted to the production of hybrid varieties which have been developed at the experiment station. Two of these varieties, Hybrid 128 and Triplet, have become well established and are grown in approximately one-third of the wheat growing area of the state. They are also extensively used in Oregon and Idaho.

Ridit, a variety developed more recently and which is immune to smut, was first distributed in small lots in 1923 and 1924 and is becoming well established. Its use gives promise, in the areas where it is adapted, of going a long way toward eliminating smut which has been a most difficult problem in wheat growing. Other hybrid varieties produced at the experiment station are grown more or less extensively.

An improvement has been brought about in both oats and barley by the introduction of Markton, Banner and Abundance for oats, and Beldi Giant for barley. The immunity of Markton oats to smut has been demonstrated by the Station, and there is now an extensive demand for this variety. The work of variety improvement has been closely associated with that of seed distribution. Each year seed of superior varieties have been distributed to farmers. The average amount distributed during the past few years has been approximately 25 tons and the growers securing this seed serve as new centers for further distribution.

Questions relating to soil fertility, soil management, crop rotations, the behavior of crop characters on hybridization, the response of crop plants to environment, weed control, etc., are major lines receiving attention. Investigators in the Departments of Farm Crops and Soils feel confident that many of these problems now confronting crop producers in the State will be solved.

* * *

Southern Sweets

(*From page 27*)

tato crop. This has been proven over and over again and is generally accepted as being the proper way to fertilize. This fertilizer should be put in the drill and listed on just before the plants are to be set.

What is wanted is a good potato of medium size and to produce this the proper preparation of the soil, the proper kind of soil, the

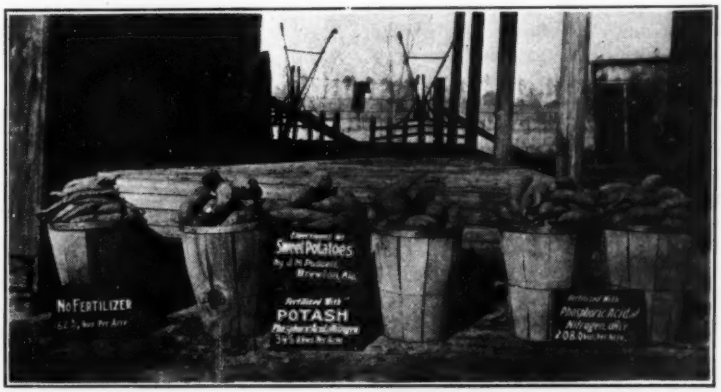
proper fertilizer, and cultivation, must be given. The United States grade No. 1 potatoes are those that are sound, of similar varietal characteristics, particularly free from dirt or other foreign matter, frost injury, decay, bruises, cuts, scars, cracks, and damage caused by heat, disease, insects or mechanical or other means. The diameter of these potatoes shall not be less than 1¾ inches, nor more than 3½ inches. The length must not be less than four inches, nor more than 10 inches, but the length may be less than four inches if the diameter is 2¼ inches or more. To grade No. 1, not more than 5 per cent by weight of the potatoes shall fail to meet the requirements as to diameter and length, and not more than 6 per cent by weight shall fall below the remaining requirements of the grade.

We are giving these requirements of the grade in order to show how important it is to do the things necessary to make the crop as large a per cent of No. 1's as possible, because No. 2's and culls are not nearly so profitable as the No. 1's.

One of the things that should be done to help make a large percentage of the potatoes No. 1 is to set the plants the right distance apart. As a rule folks set the plants too far apart, thus giving enough space to cause the potatoes to grow too large and fail to meet the No. 1 grade. The jumbos not only are usually rough in appearance, but do not have the good flavor and are not nearly so desirable for eating purposes as the medium size No. 1.

Many folks set the plants 15 to 24 inches apart, whereas, the proper distance is from eight to 12 inches, in order that the desired quality and size may be obtained. A good practice is to make the rows two and one-half feet wide and set the plants 12 inches apart. Plantings this close together will produce a much better yield of No. 1 potatoes than if the rows are made four feet wide and the plants set 15 to 20 inches apart in the hills.

The most difficult thing in connection with the sweet potato crop is not in growing them, but in curing and storing them in such manner as to prevent rot. These are big questions within themselves, and cannot be discussed here.



No fertilizer yield, 162.5 bus. per A. | 1,000 *lbs.* 6-4-10 (*PN.K.*) 345 *bus. per A.* | 1,000 *lbs.* 6-4-0 (*PN*) 208 *bus. per A.*

Cutworms

(*From page 9*)

pale western cutworm, army worm, and fall army worm. Many of these are of the real cutworm type that obtain their food by cutting the plant off near the surface of the ground and then lying hidden during the day just under the surface of the ground, near the plant that is destroyed. These kinds usually work more or less independently.

Army worms work in numbers, eating nearly everything in their path and then passing on to other food plants. They get their name from their army-like movements. Still other cutworms have a tendency to climb peach trees or grape-vines in the spring and eat the opening buds. They are called climbing cutworms. As a general rule the cutworms work during the nights or on cloudy days, hiding during the brighter part of the day.

OFTEN on warm summer evenings in early summer, grayish or brown colored "millers" may be seen flying around lights and fluttering up and down the window or screen door. These are the adults of the cutworms that lay their eggs in masses, or singly, on the leaves of grasses, weeds or shrubs, or even in the bare ground. These eggs soon hatch and the cutworms feed until winter when they are nearly half grown. Others pass the winter in the pupal stage. Those that hibernate as half-grown cutworms are the ones that make life miserable for the farmer in the spring.

While cutworms have many natural enemies that keep them in check, such as certain flies, wasps, and beetles, these are not often numerous enough to prevent great losses.

Clean cultivation will aid in the control of these pests. By this is meant the cleaning up of weeds, as many of the adults lay their eggs there. Where advisable, plowing deeply early in the fall, in cutworm infested fields, will aid in destroying many of them, as well as other common insect pests. Protective bands such as paper collars around newly set tomato or cabbage plants will, in most cases, protect them.

When climbing cutworms try to ascend the peach tree or the grape vine, they can be prevented by cotton bands or a barrier of sticky material. Any grower can make his own sticky material by heating a pound of rosin in a pint of castor oil until the former is all melted. If it is too thick more oil can be added. Pieces of rope or cloth can be dipped in this material and tied around the tree. Care about putting a sticky band directly on the bark of the trees should be exercised as it may soak in injuring the tree.

Where garden cutworms are bad, they can be controlled by the application of poison bran mash. This is applied near the plants to be protected and is made as follows:

Bran	25 lbs.
Paris green (or white arsenic)	1 lb.
Molasses	1 qt.
Lemons (or amyl acetate ¾ oz.)	3
Water	¾ gals.

The bran and poison are first thoroughly mixed together, then the molasses and flavoring are placed in a gallon of water and then sprinkled on the poisoned bran. More water is added until the mass is of such a consistency that it will crumble when thrown on the ground.

If a very little of the poison bran mash is needed, it can be

made by the following formula:

Bran	1 quart
Paris green	1 teasp.
Molasses	1 tablesp.
Lemon (chopped fine)	½ fruit

Water, enough to make a good mash.

Care should be taken not to allow chickens to have access to this material either before or after it is put out.

* * *

International Congress of Soil Science

(*From page* 28)

International Institute of Agriculture. This meeting was under the patronage of the King of Italy, who met with the delegates in person on the first day of the conference.

At this Rome meeting Dr. Jacob G. Lipman, of the New Jersey Agricultural Experiment Station, U. S. A., was elected president, and out of compliment to him, it was voted to hold the next meeting in this country. Immediately upon his return from the Rome meeting, Dr. Lipman took steps to prepare for the 1927 meeting and appointed an American Organizing Committee composed of delegates from the several States.

It will be the purpose of the Congress to go into the question of the total amount of cultivable land on the face of the earth, and related questions, which can be answered only through international study and discussion of soil problems from a world point of view. It will seek to bring out more accurate information about the soils of the world which will lead to a uniformity in the interpretation of soil and crop relations, and more accurate knowledge of the potential food-producing areas of the earth.

During the meeting there will be two local, one-day excursions out of Washington, and immediately following the adjournment of the Congress, the foreign delegates will embark upon a transcontinental excursion trip extending to the Pacific coast and thence back to New York or Washington. This transcontinental trip will be complimentary to the foreign delegates who are actively engaged in soil investigational work, and will be open to American soil workers upon payment of the actual cost of the excursion.

The United States is represented more largely in the membership of the International Society of Soil Science than any other country, having 155 members. Russia is represented by 79 members, Germany by 75, Great Britain by 40, Sweden by 34, and Czechoslovakia by 28. The society has no organic connection with the International Institute of Agriculture at Rome, but its proceedings are published there.

* * *

Minnesota Grains Lead Old-World Tests

NEW varieties of grain originated by plant breeders of the University of Minnesota have proved their hardiness and early ripening ability in experiments carried on by the German Potash Syndicate at its agricultural station at Landshut, Province of Silesia, Prussia. Silesia is a mountainous region separating Germany from Austria. Mining is one of its principal industries, and crops

are grown in the valleys and on the plateaus and find a ready market in the mining districts.

Gopher oats, a comparatively new variety developed at the Minnesota station, far surpassed seven other varieties under test at the same time at the German station. Its yield per acre was 8.20 cwt. of grain and 17.5 cwt. of straw. Its nearest rival produced but 5 cwt. of grain to the acre. The season was too wet for best results. The conclusion of the crop expert of the German station is that Gopher is a suitable variety for mountain districts because of its early maturity and its small white grain.

Minnesota rye No. 2 proved very hardy and ripened early and led all other varieties, although, on account of thunderstorms and continued rain, the yield in all cases was unusually low. In the trials with wheat, Mindum durum and Ruby, both from Minnesota, led all other varieties.

Manchuria barley, also of Minnesota origin, yielded 9.93 cwt. per acre as against the 8.91 cwt. of its nearest competitor. Of Manchuria barley the German crop expert said: "The Minnesota variety gave the best results and excelled all the other two-row varieties, of which we had 18 under test. The yield doubtless would have been higher if 1926 had not been such a wet year."

The German Syndicate procured the seed from the Minnesota Crop Improvement Association at University Farm, and each year makes a report to association officials.

* * *

Pasturing Away the Nurse Crop

By George R. Harrison

County Agent, Pottawattamie County, Iowa

GROWING in favor from one end of the country to the other is the pasture method of grass seeding. Take it for alfalfa, red clover, or any grasses or mixture thereof, and the pasture method will win when others fail. I am convinced of this since I have visited many farmers who use it, and not once have I found a failure from it.

The pasture method consists of sowing the grass seed with the small grain as usual, but as soon as the grain crop is large enough to give a good bite, the livestock are turned in. They eat the nurse crop, and this allows the tender meadow crop to harden in the sun. At the same time the soil is being packed about the tiny plants to bring their moisture supply closer to the surface.

When this plan was first shown to me by a farmer some years ago, I paid but little attention for I lacked faith, and, certainly, understanding. When later I was convinced of its efficiency, I passed the story on to a friend authority who, like I had been, was very skeptical of it. "Why, the livestock would tramp the little alfal-

fa to death," he declared. But as it happens the tramping is one of the virtues of the method.

For some 50 years the Huelle family of southwestern Iowa were sowing alfalfa in the spring on the fall wheat, and they usually had pretty good success with the stands. But time passed. The younger generation decided to quit raising wheat, and so the only other place for the alfalfa seedings was in the oats. That proved very disappointing. So often after the ripe grain was cut, the alfalfa withered in the heat. Then somehow the Huelle boys hit upon the idea of pasturing away the oats to give the alfalfa a better chance, and they say that never since have they failed to get a stand.

John F. Hull of Logan, Iowa, is known as one of the best and most prosperous farmers in his part of the State. For years he has been pasturing the oats away from his spring seedings of alfalfa and grass crops. The last time I paid him a visit he had sown alfalfa in the oats as usual. It was in the season of 1926, the driest on record. Also he had sown in another field a mixture of timothy, red clover, blue grass, white clover, alsike, and sweet clover, and again oats had been the nurse crop. In both cases the cattle had eaten the oats and the stand of alfalfa was excellent. Other seedings in this vicinity of the same seed stock and on the same kind of soil had suffered severely after the small grain harvest. Hull is another who declares that the tramping is one of the benefits.

Another outstanding example of the pasture method is found on the farm of George Darrington, Honey Creek, Iowa. Darrington discovered the plan by accident. He had fenced a lane through his oats and alfalfa seeding so that the cattle could reach a blue grass pasture. To his surprise the only place the alfalfa showed up well in the fall was in the lane. There was alfalfa everywhere except in the solidly beaten cowpath. The alfalfa over the fence in the stubble was dead. This was some years ago, and ever since then Darrington has practiced the pasture method and he has won local distinction for success with alfalfa.

But after the alfalfa once is established in that first season, none of the foregoing men will allow a hoof on it, for pasturing it in the full meadow stage is something quite different from pasturing off the nurse crop.

Mention the plan to the farmer who has never seen it demonstrated and he will invariably declare, just as the authority did, that the cattle will tramp the tender crop to death, but evidently tenderness of these grass crops is mainly due to shading and smothering by the so-called nurse crop itself. Let the sun to it suddenly with the cutting of the grain and heavy damage is sure to result except in some infrequent year when the rainfall is sufficient. I noticed this when I was a young man shocking oats on clover seedings in Indiana.

Of course the farmer who adopts the pasture method will use some judgment. He will not allow the cattle to mud over it in wet weather, nor will he pasture it so heavily that the stock are forced to clip the little grass crop very closely, for that is even worse than mowing an alfalfa crop long before it is ready. There is a too early stage for taking the crop, and whether it is taken by teeth or sickles, it amounts to the same thing. Cattle do not bite closely like horses and sheep, for they must fold their forage to them with their tongues. Consequently cattle are not a menace. They are instead a benefit to the little alfalfa when the pasture method of seeding is used.

Confidence

(*From page* 4)

while the confidence we have in plants and things is often born of unknown, immutable laws.

For instance, I know that if I do my brother or my dog a good turn, they will be my pals and confidants until the crack of doom. That is, if I give my service to them through love more than through duty, this will surely follow.

But if I plant a seed it will thrive and grow or wane and die of its own sovereignty, being governed only by conditions and circumstances having no direct connection with anything that is a part of me.

The confidence we have in ourselves and in each other is thus a feeble but noble imitation of the mysterious forces that inspire our confidence in plants and nature.

Your arrant egotist or selfish bully measures the mileage of the world by his own crooked speedometer. It is left for men or women with trained and discriminating self-confidence to deal justly and with purposeful results.

"All the world is an oyster" to the egotist or bully, whose confidence is too highly geared. In a still lower level of humanity this warped misuse of the term is known as "con."

When Uncle Silas bought the gold brick or leased the city hall, his own positive confidence became the temporary victim of the negative brand of confidence—the kind that preys on trust and leads to all the crimes in the calendar.

Here I may paraphrase Iago when he said: "He who steals my purse steals trash—but he who filches from me *my good confidence* doth not enrich himself but makes me poor indeed."

Misplaced confidence is simply the old trick of the imitator or the substitute swindler brought into the realm of the spirit. It is the counterfeit proffer of false specie payment, but its presence should not destroy our faith in the original article.

When I received a bum two-bit piece from the clerk at the cigar store yesterday, I handed it back; but I didn't get the idea that the mint had quit coining the real article.

THE greatest, most helpful thing about confidence is that it thrives on obstacles, and often overcomes dilemma.

Adversity is the foe of fools and cowards, but it is the motivating force that directs and encourages confidence in the hearts of trained men.

"Robinson Crusoe" was written in a prison. "Pilgrims' Progress" appeared in Bedford jail. Sir Walter Raleigh wrote the "History of the World" during 13 years' imprisonment. Luther translated the Bible while confined in Wartburg Castle. Dante worked in exile and partly under sentence of death. The list of poor boys who have worked upward by sheer ability and confidence is the undying pride of America.

Confidence is the ideal which statesmen wish to inspire. It is to banking and finance what virtue is to women. It is the only excuse for the installment plan and the good humor of my grocer.

Confidence gives me a job and keeps it for me. Confidence in the schedule of the interurban bus allows me to consume an extra cup of Java before I grab my hat. My confidence in the safety of rapid elevators and lofty sky-scrapers is so much a part of routine that I forget where confidence leaves off and custom begins. Confidence

keeps me sublimely busy in my garden of evenings despite the vegetables I had to buy last fall. Confidence makes us turn our faces to the east every morning when we got our last glimpse of Old Sol shining in the ruddy west.

Divorce courts and jails are not so much monuments of a broken down system of confidence as they are of ignorance of what confidence really is and means.

DESTROY confidence or undermine it by an attempt to provide artificial substitutes for it, and the whole fabric is ruined.

Take two present-day victims of this process and see what I mean.

These are Youth and Agriculture. Both are being pointed out as decadent, unfit, feeble, and doomed to disaster.

Old men sagely shake warning fingers at the pranks of gilded youth and declare the world's juniors are a joke! Their maledictions and dire prophecies cause many to lose confidence in young men and women at a period in their lives when confidence in them must be imposed in order to bring out honor, probity, and responsibility. Is it any wonder that some young folks find it so hard to be good when we alluringly teach them how to do wrong and then advertise them in advance as exponents of villainy?

Agriculture is the victim of those who are trying to substitute something besides hard work and common sense for the handmaidens of confidence.

By dinning the ditty of despair in the ears of farmers they are lowering land values, reducing credit facilities, discouraging initiative—when some good, old-fashioned confidence would be the right tonic.

Yet methinks Youth and Agriculture will be waxing powerful long after the graves of our doleful critics have been paved with the cement road to progress.

In my newspaper work I have learned that the greatest stories are built on either great confidence, well placed and well directed, leading to success or marvels; or to misdirected or misplaced confidence, or none at all.

I have interviewed men who ruled empires and moved mountains, and in the same day have looked at suicides in the morgue.

And through it all I have sensed that there were tens of thousands of happy folks who never get into the news columns because their brand of every-day confidence is like that of the Fishermen of Galilee. It may not get them into the limelight or the limousine but it carries them safely past the divorce court, the poor house and the jail.

DON'T worry about the obscurity or humility of your confidence. That may prove to be its saving grace.

"Crust" and "nerve" have posed as confidence long enough. Indecision and moral cowardice are weeds to be yanked from the patch of flowering confidence.

This is early in the year, but I am going into training. My next New Year's resolution will be for more confidence in my confidence.

The same to you!

MISUNDERSTANDING SOMEWHERE

"Mother, how do you spell 'tunkin'?"

"'Tunkin'," said the mother. "I never heard of such a word. How do you want to use it?"

"Why I am writing to my teacher, and I am telling her I love her more than tunkin tell."

INJUN TALK

Quinine: "If Minnie in Indian means water, what does Minnesota mean?"

Arsenic: "I'm sure I don't know."

Quinine: "Sota water, you poor fish!"

"When I was a little boy your age I didn't tell lies," said Dad reprovingly.

"How old were you when you started, pop?" inquired small boy skeptically.—*Safety and Service.*

He—"Did you ever know that you look like Helen Brown?"

She—"That so. I look even worse in blue.

The willows are weeping for John H. Best,
He changed the labels in his medicine chest.

THE LITTLE SCHEMER

Druggist—"What kind of soap do you want, lad?"

Johnny—"I want some that's got lots a perfume in it so's Ma'll know I washed my face an' won't make me do it over agin every time."

Officer (to couple parked in auto)—"Don't you see that sign, 'Fine for parking'"?

"Yes, officer, I see it and heartily agree with it."

THE FIRST THING

Teacher: What is the hardest thing to learn about farming?

Student: Getting up at 5 a. m. —*M. I . T. Voo Doo.*

CONGRATULATIONS, UNCLE BILLIE!

Uncle Billie Hack says his new tonic is no good; all the directions it gives are for adults and Uncle Billie says he's never had 'em.—*The Farm Journal.*

Mrs. W.—"Nora, was the butcher impudent again when you telephoned your order this morning?"

Nora—"Sure, but I fixed him this time. Oi sez, 'Who the hell do youse think you're talking to? This is Mrs. W. talking.'"

EASY TERMS

Algy's acquiring a moustache
'Neath his patrician beak;
Getting it on the instalment plan,
A little down per week.

Husband—Dear, will you please turn off the radio?

Wife—But it isn't on dear. Now, as I was saying—

EXPLANATION

"John I smell cider on your breath."

"Nothing of the kind, dear, but my collar is so tight it squeezes my Adam's apple."

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There must *be a* reason!

LOOK back a few years at a few typical North Atlantic states, . . . Vermont and Massachusetts, and New York.

In 1920, Vermont farmers used an average of 2.50% potash in their fertilizers, . . . in 1925 this had been increased to 5.35%. In 1920, Massachusetts farmers used an average of 3.45% potash in their mixtures . . . by 1925 this had grown to 5.51%.

In 1920, New York farmers used an average of 3.24% potash in their mixtures . . . by 1926 this had increased to 5.87%.

There must be a reason! And the reason must be profit! Progressive farmers have found that *potash pays* . . . that's why they use more of it. Are you keeping in line with these profit-makers?

Do your small grains lodge . . . is your corn chaffy . . . do you fail to get a good stand of alfalfa, clover or hay . . . have you noticed small white spots on your alfalfa or yellowish brown ones on your clover? If so, your land is potash hungry and you can profitably use a higher per cent of potash in your fertilizer.

Feed your hay crops properly and save some of the dollars you now spend in feed. A few dollars invested in potash combined with other necessary plant foods may mean a big increase in your profit. Try it and see!

FREE—*A new booklet, "Better Grains and Hay," is on the press. If you would like a free copy, write us and we will mail your copy promptly.*

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POTASH